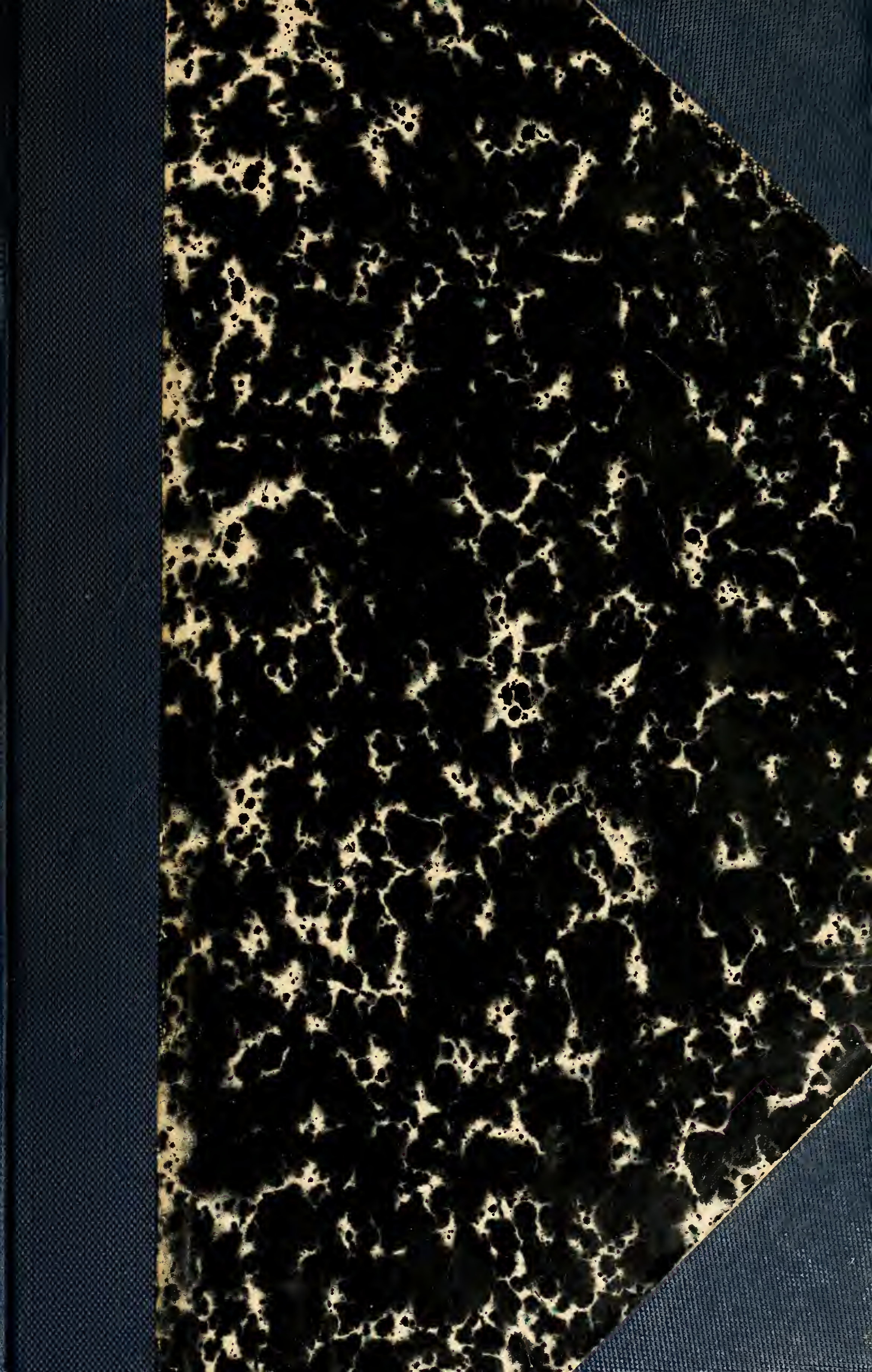

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OF THE

BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY.

VOLUME IV.

HONOLULU, H. I.
Bishop Museum Press.
1906-1911

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1906.

FISHES OF THE SOUTH PACIFIC.

DURING the period from November 9, 1900 to September 21, 1903, it was the writer's privilege to make collections of fishes for the Bernice Pauahi Bishop Museum in the following islands: Tahiti and Raiatea, of the Society group; Tubuai, of the Austral group; Mangareva, of the Gambier group; Rarotonga, of the Cook group; Makatea, of the Paumotu group; Nukuhiva, of the Marquesas group; Fatè, of the New Hebrides; Shortland, of the Solomon group.

A total of 1550 specimens were secured, representing 375 species, 33 of which seem to be new to science.

I am indebted to President Jordan for various suggestions and for the permission to compare my specimens with those contained in his collections from Samoa and Hawaii.

The nomenclature adopted is essentially that adopted by President Jordan in his forthcoming report on the Fishes of Samoa, in the preparation of which the present writer has taken part.

ALVIN SEALE.

Stanford University, Cal.
August 12, 1904.

LIST OF NEW SPECIES, WITH LOCALITY.

—Gymnothorax zonipectis. Tahiti.
Gymnothorax tahitensis. Tahiti.
Gymnothorax marquesensis. Nukuhiva.
Hemirhamphus australensis. Tubuai.
Cypselurus tahitensis. Tahiti.
Sphyræna goodingi. Nukuhiva.

Myripristis sanguineus Jordan & Seale. Tahiti. (Samoa.)
Myripristis phæopus. Nukuhiva.
Upeneus aurantiacus. Tubuai.
Promethichthis pacificus. Nukuhiva.
Epinephelus zapyrus. Tahiti.
Lutianus nukuhivæ. Nukuhiva.
Lutianus tahitensis. Tahiti.
Lutianus melanesiæ. Solomon Ids.
Cæsio teres. Solomon Ids.
Abudefduf jordani. Solomon Ids.
Abudefduf cæsio. Tubuai.
Scarichthys rarotongæ. Rarotonga.
Callyodon waitei. Tahiti.
Callyodon ultramarinus Jordan & Seale. Mangareva. (Samoa.)
Siganus shortlandensis. Solomon Ids.
Siganus zoniceps. Solomon Ids.
Monacanthus fatensis. Solomon Ids.
Ostracion dexteri. Society Ids.
Ostracion chryseres. Tubuai.
Ostracion auricauda. Mangareva.
Scorpænopsis quiescens. Tahiti.
Deleastes dæctor. Tahiti.
Leptecheneis flaviventris. Mangareva.
Salarias azureus. Tubuai.
Salarias tubuensis. Tubuai.
Salarias cæsius. Tubuai.
Antennarius lutescens. Tahiti.

LIST OF SPECIES.

Family CARCHARIIDÆ.

Carcharias sorrah Muller & Henle.

One specimen, No. 1284 B. M.[1] Length 29 inches. From Shortland Id., Solomons.

Family ELOPIDÆ.

Megalops cyprinoides (Broussonet).

One specimen, No. 741 B. M. From Tubuai, Austral Ids.

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[1] The letters B. M. after a specimen number stand for B. P. Bishop Museum. All numbers followed by an * have been duplicated in the manuscript.

FAMILY ALBULIDÆ.

Albula vulpes (Linnæus).

Depth 5; head 3.90 (without flap); eye 4.75; D. 17; A. 9; scales 79 in lateral line; interorbital space 3.95.

Body elongate, slightly compressed, scaled, the lateral line complete; a row of modified scales down the back; elongate axillary scales; head naked; snout conical, overlapping the small inferior mouth; maxillary short, forming lateral margin of upper jaw and reaching to below the eye; jaws, vomer and palatins with bands of villiform teeth; broad patches of coarse blunt pavement teeth on base of tongue and sphenoidal bones; eye covered with adipose membrane.

Color in spirits, silvery with about 10 narrow dusky longitudinal lines above the lateral line and several less distinct ones below; fins yellowish white, the caudal margined with dusky. Four specimens, from Tahiti, Nos. 716, 717, 1489 and 1490 B. M.

Two young specimens were taken at Fatè, New Hebrides, No. 833 B. M.

FAMILY CLUPEIDÆ.

Sardinella kunzei (Bleeker).

Two specimens, Nos. 866 and 867 B. M., from Fatè, New Hebrides.

Three specimens, Nos. 1092, 1093 and 1214 B. M., from Shortland Id., Solomons.

Stolephorus delicatulus (Günther).

One specimen, No. 1199 B. M., from Shortland Id., Solomons.

FAMILY SYNODONTIDÆ.

Synodus varius (Quoy & Gaimard).

One specimen, No. 829 B. M., from Mangareva, Gambier Ids.

Trachinocephalus myops (Forster).

Two specimens, Nos. 1094 and 1153 B. M., from Shortland Id., Solomons.

One specimen, No. 1980 B. M., from Rarotonga, Cook Ids.

Saurida gracilis (Quoy & Gaimard).

One specimen, No. 1298 B. M., Shortland Id., Solomons.

FAMILY ANGUILLIDÆ.

Anguilla megastoma Kaup.

Depth 2.10 in head; head 2.80 in distance from snout to vent; length of head 1.75 in distance from gill openings to origin of dorsal; eye 2.10 in interorbital; snout from opening of posterior nostril is 6 in head, its width at both nostrils much greater than depth; origin of dorsal nearer the snout than the tip of tail; the distance between the origin of anal and dorsal 3 in head; anterior part of snout and head flat, its width greater than its depth; angle of mouth 3.14 in head; upper jaw with fleshy lobes on sides equal in width to the eye; lower jaw slightly the longest; anterior nostrils prominent hollow tubes, situated on each side of tip of snout, their length 2 in the distance between their bases; posterior nostrils are two small round holes directly in front of upper part of eye; distance between round and tubular nostrils equal to the distance apart of the anterior nostrils; distance between posterior nostrils equal to interorbital space; gill openings are in front of pectorals, of moderate size, 2 in length of pectorals; mucus pores between nostrils and on lower jaw prominent; thick bands of small teeth in both jaws and vomer; no teeth on tongue; no fangs; pectoral fins prominent, rounded, of about 15 rays, length of the fin 3.20 in head, its base equal to distance between anterior nostrils; vertical height of dorsal slightly greater than vertical height of anal; origin of dorsal .75 of an inch in front of vent in specimen 16 inches long.

Color, a uniform dirty brown, fading into yellowish white on belly; anal fin a light drab with a broad yellowish white border which runs out on posterior part of fin, the tip and the tip of caudal and dorsal being much darker brown.

Three specimens from Tubuai island. No. 787, length 23 in.; No. 788, length, 16 in.; No. 789, length 14 in.

Three specimens from Rarotonga, Cook Ids., Nos. 1953-1955 B. M.

FAMILY MURÆNIDÆ.

Gymnothorax pictus (Ahl).

One specimen, No. 1159 B. M., from Shortland Id., Solomons.

One specimen, No. 2470* B. M., from Makatea, Paumotu Ids.

One specimen (head), No. 804 B. M., from Mangareva, Gambier Ids.

One specimen, No. 1540 B. M., from Tahiti.

One specimen, No. 1955* B. M., from Rarotonga, Cook Ids.

Gymnothorax detactus Bryan & Herre.

Ten specimens, Nos. 2389-2392, 2393-2398 B.M., from Nukuhiva, Marquesas Ids.

Gymnothorax nebulosus (Ahl).

One specimen, No. 1095 B. M., from Shortland Id., Solomons.

Two specimens, Nos. 2382 and 2383 B. M., from Nukuhiva, Marquesas Ids.

Gymnothorax rhodocephalus Bleeker.
(*Gymnothorax formosus* Bleeker.)

One specimen, No. 1057 B. M., Rarotonga, Cook Ids.

Gymnothorax favagineus Bloch & Schneider.
(*Murœna tessellata* Richardson.)

One specimen, No. 1079 B. M., from Fatè, New Hebrides.

Gymnothorax tenebrosus (Richardson).

One specimen, No. 1539 B. M., from Tahiti, Society Ids.

Gymnothorax zonipectis Seale, new species.

Depth 2 in head; head 3.50 in distance between vent and tip of snout; vent is nearer to tip of snout than to tip of tail by a distance equal to head; snout rather elongate, 4 in head; eye 2 in snout; interorbital space slightly greater than eye; tubes of anterior nostrils equal in length to eye; top of head wide and flat; the middle width and depth of snout equal; the head broadens rapidly from posterior margin of orbital; lower jaw from tip to angle 2 in head; the jaw curved and cannot be completely closed; a single row of sharp pointed teeth in each jaw, 14 on each side of each jaw; long sharp depressible teeth on vomer; a row of dull blunt teeth on palate; no scales; no pectoral fins.

Color in spirits, a light bistre brown; two rows of dendritic black spots along the sides, about 48 of these spots in each row; just above and below these spots are short black bands which extend through the fins and connect with its fellow of the opposite side; head mottled and flecked with white and brown; a white band extending from lower posterior margin of eye to above the angle of the jaws; another short white line from upper posterior margin of eye back, and up, over the sides of head; throat and under jaw with six white cross bands.

One specimen from Tahiti. Length 18 in. No. 1362* (Fig. 1.) B. M.

Gymnothorax nubilus (Richardson).

This species has a single series of sharp-pointed flat teeth, 12 on each side of the jaws; a single row of small blunt teeth on palate, no teeth on vomer or palatine.

Color in spirits, a light bistre brown, with irregular dark brown blotches more or less confluent into bands which extend upon fins; no dark spot at gill openings; anal fin with a distinct white band along the margin, the width of the band being a third of the fin; angle of mouth with a brown spot, in front of which is a white blotch; under part of chin whitish.

Two specimens, Nos. 1364 and 1365 B. M., from Tahiti, Society Ids.

Gymnothorax tahitensis Seale, new species.

Depth 1.50 in head; head 3.20 in length in front of vent; the length of body less than tail by a distance equal to two-thirds the length of head; eye 8 in head, 1.75 in snout, it is slightly nearer

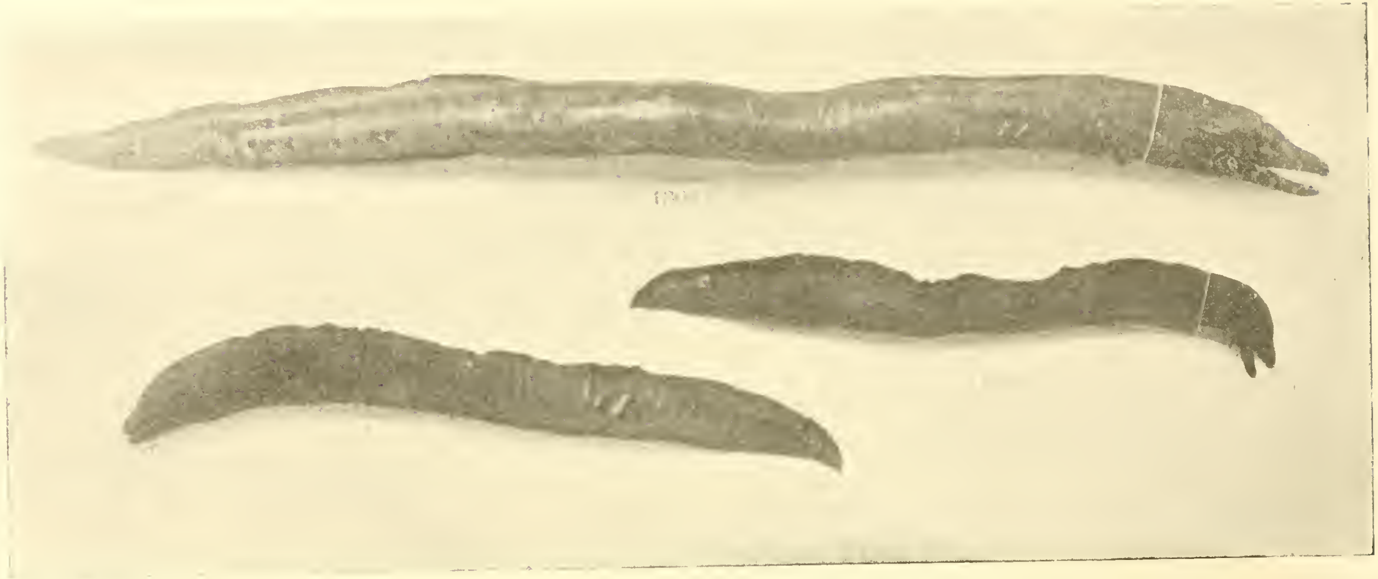

FIG. 1.—1362. Gymnothorax zonipectis Seale. 1367. Gymnothorax tahitensis Seale. 2384. Gymnothorax marquesensis Seale.

the angle of jaws than tip of snout; anterior nostrils tubular, short, equal to one-half the diameter of eye; posterior nostrils round holes over anterior half of eye; interorbital 1.20 in snout; a longitudinal groove on top of head; gill openings small, equal to eye; distance from angle of jaw to tip 2.10 in head; teeth in upper jaw biserial, the inner row the largest; a group of 9 enlarged canine-like teeth in anterior third of upper jaw of which three are on the vomer, the two posterior maxillary teeth are the largest and closely resemble fangs; a single series of blunt teeth on the palates; sides of lower jaw with a single series, except at tip where there are 6 enlarged canines, about 20 teeth on each side.

Color in spirits, a lamp black, lighter on belly which has some brownish reticulations and black spots; some lighter yellowish blotches on fins, intermingled with bluish black; head without markings, the under jaw is a shade lighter in color.

One specimen from Tahiti, No. 1367 (Fig. 1) B. M. Length 8.50 in.

Gymnothorax thyrsoideus (Richardson).

One specimen, No. 1037 B. M., from Fatè, New Hebrides.
One specimen, No. 759 B. M., from Tubuai, Austral Ids.

Gymnothorax flavomarginatus (Rüppell).

In life this eel is a pale yellowish, thickly marbled with light brown, as figured by Bleeker (Atl. Icth. Tab. CLXXVIII, fig. 3) with a black spot at gill openings. In spirits it becomes a darker brown, but not densely marbled with black. (Günth. Cat. Fishes, Vol. VIII, p. 120.) Teeth are uniserial except vomerine series, which are forked in front.

One specimen, No. 762 B. M., from Tubuai, Austral Ids. Length 17 in.

One specimen, No. 1584 B. M., from Raiatea, Society Ids.

Gymnothorax undulatus (Lacépède).

Depth 1.80 in head; head 2.25; eye 1.50 in snout, its snout is midway between snout and angle of jaws; interorbital equal to middle width of snout; jaws equal, their inner length from tip to angle 2.15 in head; greatest width of head 3.19 in its length; gill openings without black spot.

Body elongate, cylindrical; no scales; no lateral line; head swollen above; the lower jaw slightly curved; teeth in a single row in jaws; the six anterior teeth of upper jaws enlarged depressible canines, vomer with two or three depressible canines; palate with a single row of six small but sharp-pointed teeth; posterior half of upper jaw has about 13 short oblique teeth in each side; the lower jaw has 21 small sharp teeth in each side, and 4 big canines in front of these; tongue atrophied; anterior nostrils tubular, situated on the upper lip; posterior nostrils are circular holes on top of snout in front of orbit; snout from the anterior margin of eye 5.50 in head. Fins: no pectoral fins; origin of dorsal is about the length of snout in front of gill openings; origin of anal directly posterior of vent, which is slightly nearer the snout than tip of tail.

Color in spirits, very blackish and shading into yellowish gray below and anteriorly; irregular, vertical white lines, more or less wavy and about a third as wide as interspaces, on side of body the lines becoming regular and band-like posteriorly, anteriorly the lines join more or less, forming irregular squares and polygons; thorax and belly yellowish white; snout and anterior half of lower jaw black; fins colored similar to body, but fewer lines.

One specimen from Tubuai Id., of the Austral group, No. 770 B. M. Length 21 in.

One specimen, No. 1583 B. M., from Raiatea, Society Ids.

Gymnothorax marquesensis Seale, new species.

Depth 10 in total length; head 3 in length anterior of vent; length of body greater than length of tail by a distance equal to 2.50 in head; teeth biserial except in front where there is a group of about 7 enlarged depressible canines, two of which are on the middle of the vomer; the inner series consists of about 8 teeth on each side; teeth of the lower jaw are in a single series with a cluster of canines in front; eye equal to the distance apart of the posterior nostrils; snout 4.70 in head; angle of the jaw 2.30 in head.

Color in spirits, a dull yellowish or gray with blackish irregular cross bands wider than the interspaces; on the posterior part of the body and tail these bands are more broken into indistinct dots; the belly is powdered with a yellowish spray.

A short, thick moray. Nine specimens, from Nukukiva, Marquesas Ids., Nos. 2384-2388 B. M. No. 2384 (Fig. 1) is type of the species.

Gymnothorax chalazius Waite.[2]

Depth 6 in distance from tip of snout to vent; head 2.50 in the same distance; eye 7.50 in head, 1.50 in snout; the vent is nearer tip of snout than tip of tail by about the length of head; middle of eye is midway between angle of mouth and tip of upper jaw; interorbital space slightly less than width of snout; anterior nostrils tubular, short, equal to one-half the width of eye; posterior nostrils not tubular, situated above and in line with anterior magin of eye; teeth in upper jaw in a double series the inner ones the longest, 14 on each side; in the front of upper jaw are 8 enlarged depressible canines, 2 on the vomer and 3 on each side, smaller teeth forming the outer row; a row of blunt teeth on the palate; lower jaw with a single series of teeth, the 2 or 3 anterior ones in each side enlarged, depressible canines.

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[2] The type secured by Mr. Waite corresponds to the first specimen in the series No. 765 B. M.

Body is elongate, cylindrical; no pectoral fins. The 4 specimens of this species, secured at Tubuai Id., of the Austral group, form a series which show no structural differences,[3] and in which the color markings intergrade perfectly.

No. 765 B. M., a female, 11.75 in. in length, has the following color markings: In spirits, color dark brown, shading into black on the posterior half of the body; the body covered with minute white dots, like pin points, yellow in life, none of the dots are as large as the head of a pin, these dots very numerous on the anterior third of body and head, but gradually decreasing in number posteriorly, until on the posterior half of the body they are few and widely scattered; belly and throat yellowish white, being powdered with yellowish dots; in addition to the above there is on the anterior half of the body a number of round, indistinct black spots the size of eye, these show a tendency to form imperfect vertical, band-like arrangement; fins colored similar to body, caudal with a narow white margin.

No. 763 B. M., a female, 10 in. long, is colored and marked exactly as above, except the dots are a trifle larger, being the size of pin heads; the yellow coloring on the belly showing a tendency to become reticulate.

No. 766 B. M., a male, 11.50 in. long, colored and marked as No. 763 except the dots are larger being the size of the pupil of the eye, the ground color is a shade less dark, and the anterior dots show a tendency to become less regular in their roundness.

No. 769 B. M. Length 10 in. Colored as No. 766, except the dots are still larger, and show a decided tendency to become reticulate, especially on the anterior part of the body.

All of the specimens show the round, indistinct black spots, the size of the eye on the anterior half of the body.

Four specimens, Nos. 763, 765, 766 and 769 B. M., from Tubuai, Austral Ids.

Another moray, No. 1566, from Tahiti, was provisionally but probably incorrectly identified with *Rabula marmorea* (Valenciennes) from the Galapagos Ids.

Uropterygius concolor (Rüppell).

One specimen, No. 2005* B. M., from Nukuhiva, Marquesas Ids.

Scuticaria tigrina (Rüppell).

One specimen, No. 1362* B. M., from Tahiti, Society Ids.

One specimen, No. 2381 B. M., from Nukuhiva, Marquesas Ids.

Europterygius xanthopterus (Bleeker).

Three specimens, Nos. 2006-2008 B. M., from Nukuhiva, Marquesas Ids.

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[3] The male specimen, No. 766, has the head slightly swollen above, a longitudinal groove divides this swollen portion into two lobes.

Scuticaria marmorata (Lacépède).

Four specimens, Nos. 2399-2402 B. M., from Nukuhiva, Marquesas Ids.

FAMILY MORINGUIDÆ.

Moringua javanica Kaup.

One specimen, No. 2003* B.M., from Nukuhiva, Marquesas Ids.

Echidna polyzona (Richardson).

One specimen, No. 2001 B. M., from Nukuhiva, Marquesas Ids.

Echidna amblyodon (Bleeker).

Two specimens, No. 2003* and 2004 B. M., from Nukuhiva, Marquesas Ids.

FAMILY PLOTOSIDÆ.

Plotosus anguillaris (Lacépède).

Three specimens, Nos. 1256, 1326 and 1327 B. M., from Shortland Id., Solomons.

FAMILY BELONIDÆ.

Tylosurus giganteus (Schlegel).
(*Belone annulata* Cuv. & Val.)

One specimen, No. 747 B. M., from Tubuai, Austral Ids.

Tylosurus choram (Forskal).

One specimen, No. 1357 B. M., from Tahiti. Length 28 in. It is referred to this species with some doubt.

Belone platura Bennett.

Three specimens, Nos. 1070, 1071, 1072 B. M., from Fatè, New Hebrides.

FAMILY EXOCŒTIDÆ.

Hemiramphus australensis Seale, new species.

Depth 4.78 in head; head 2.75; beak anterior of the upper jaw 4.30 in length; eye 7.40 in head, 3.75 in beak; interorbital space slightly concave with two distinct grooves; D. 16; A. 15; scales 56.

Body elongate, covered with deciduous scales; the depth but slightly greater than the width; head with lower jaw prolonged into a beak; the upper jaw short, its shape like a triangular flap, its length equal to its width; the tip of the upper jaw is exactly midway between tip of lower jaw and posterior margin of the opercle; teeth in both jaws in villiform bands; the origin of the dorsal fin is exactly over the origin of the anal and the bases of the two fins are of about equal length; base of anal equal to distance from origin of anal to the middle of the ventrals; the origin of the ventrals much nearer base of caudal than to the posterior margin of the opercles; length of ventrals 3.50 in head; pectorals short, equal to the distance from anterior margin of orbit to posterior edge of opercle; caudal forked, the lower lobe much the longest.

Color in spirits, silvery below, bluish above, a silvery band along the sides; fins all white.

One specimen, No. 746 (Fig. 2) B. M., from Tubuai, Austral Ids. Length 11.1 in.

Hemiramphus affinis Günther.

Three specimens, Nos. 851, 842 and 840 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 2489*-2490* B. M., from Makatea, Paumotu Ids.

Hemiramphus commersonii (Cuvier).

Two specimens, Nos. 1331 and 1332* B.M., from Shortland, Solomon Ids.

Hemiramphus eclancheri Cuvier & Valenciennes.

Three specimens, Nos. 2121-2123 B. M., from Nukuhiva, Marquesas Ids.

Hemiramphus platurus Bleeker.

Two specimens, Nos. 1951-1952 B. M., from Rarotonga, Cook Ids.

Hemiramphus melanurus Cuvier & Valenciennes.

One specimen, No. 1221 B. M., from Shortland, Solomons.

Cypselurus tahitensis Seale, new species.

Depth 5.50; head 4.20; eye 3.10; D. 12; A. 10; scales 43; interorbital 3 in head.

Body elongate, slightly compressed, covered with large scales, 24 rows between occiput and origin of dorsal; head short and blunt; the interorbital space concave; snout short, 4 in head; mandible slightly protruding; villiform teeth in bands on anterior of jaws and on palatines, in single series along sides of premaxillary, no teeth on vomer or tongue; gill rakers small; base of dorsal fin 1.50 in head, its longest ray 1.70; anal short, the longest ray 2.10 in head; pectorals very long, reaching to base of caudal and used as an organ of flight; origin of the ventrals much nearer base of snout, they reach to base of sixth anal ray; caudal forked, the upper lobe 1.20 in head, the lower lobe about twice as long as upper.

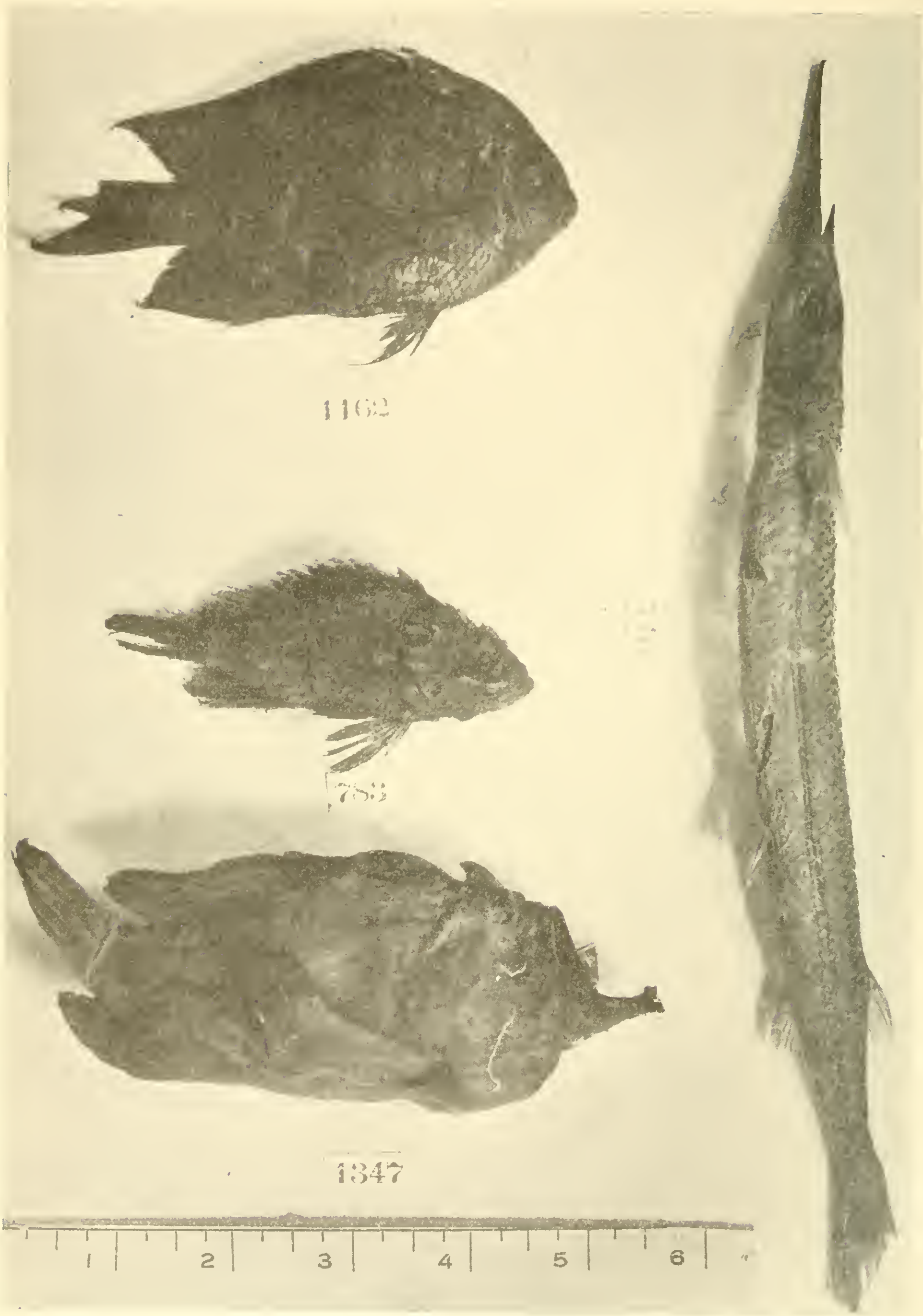
1162
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FIG. 2.—1162. Abudefduf jordani Seale. 783*. Scorpænopsis quiescens Seale. 1347. Antennarius lutescens Seale. 746. Hemiramphus australensis Seale.

Color in life, blue above, silvery below; iris yellow and black; fins bluish, except ventral and anal which are white.

Color in formalin, bluish above, white below; pectorals a deep uniform blue; dorsal dusky; ventral and anal white; caudal with a wash of dusky.

One specimen from Tahiti. No. 1413 (Fig. 3) B. M. Length 13 in.

Exocœtus volitans Linnæus.
Exocœtus evolans Linn.

Color in life, bluish above, white below, fins white, the pectorals with a few round dark spots.

One specimen, No. 1443 B. M., from Tahiti, Society Ids.

Cypselurus oligolepis (Bleeker).

One specimen, No. 1208* B. M., from Shortland Id., Solomons.

FAMILY ATHERINIDÆ.

Atherina lacunosa Forster.

Ten specimens referred to this species were secured at Shortland Id., Solomons, Nos. 1280, 1299*, 1309*, 1311, 1316*, 1323, 2226*, 1234, 1246 and 1274 B. M. Four specimens from Fatè, New Hebrides, No. 865 B. M.

These fish swarm in countless millions about the shores of Shortland Id. during the months of June and July.

FAMILY MUGILIDÆ.

Mugil kelaartii Günther.

Two specimens, Nos. 1341, 1342 B. M., from Tahiti.

Querimana crenilabris (Forskal).

Two specimens, Nos. 702* and 703* B. M., from Tahiti.

Myxus leuciscus (Günther).

One specimen, No. 2484* B. M., from Makatea, Paumotu Ids.

Liza waigiensis (Quoy & Gaimard).

Two specimens from Mangareva Id., No. 806 B. M., L. 5.75, and No. 807 B. M., L. 6.50 in. These have black pectorals, C., A. and V. yellowish; spinous dorsal yellowish; soft dorsal dusky.

One specimen, No. 975 B. M., from Fatè, New Hebrides.

One specimen, No. 1131* B. M., from Shortland Id., Solomons.

One specimen, No. 1599 B. M., from Raiatea, Society Ids.

Two specimens, Nos. 1958 and 1959 B. M., from Rarotonga, Cook Ids.

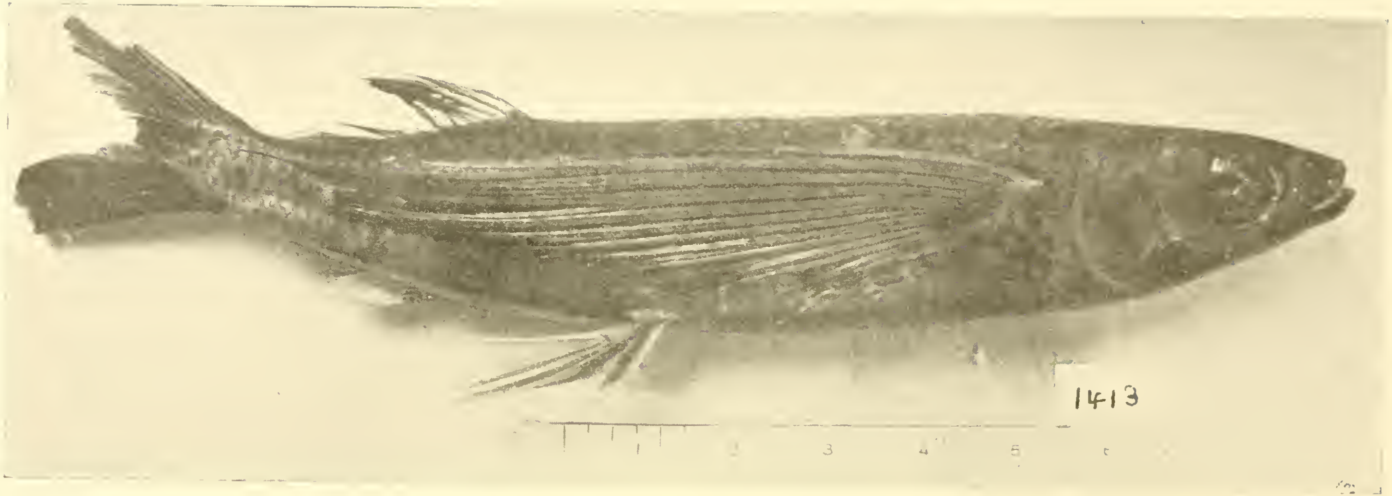

FIG. 3.—1413. Cypselurus tahitensis Seale.

Mugil cephalus Linnæus.

Two specimens of the common Polynesian mullet, Nos. 1532 and 1523 B. M., from Tahiti.

Two specimens, Nos. 1579* and 1598 B. M., from Raiatea, Cook Ids.

One specimen, No. 2264 B. M., from Nukuhiva, Marquesas Ids.

Two specimens, Nos. 1960 and 1962 B. M., from Shortland Id., Solomons.

FAMILY AULOSTOMIDÆ.

Aulostomus valentini (Bleeker).

One specimen, a young, length 3 in., No. 1406 B. M., from Tahiti.

Depth 20; head 3; eye 9; snout 4.50 in length; interorbital 10.50 in head; caudal peduncle 2 in snout.

FAMILY FISTULARIIDÆ.

Fistularia petimba Lacépède.
(*Fistularia depressa* Günther).

One specimen from Mangareva Id., No. 803 B. M. Length 37 in.

One specimen, No. 1083 B. M., from Fatè, New Hebrides. Color light brown, yellowish below, fins yellowish white.

One specimen, No. 1226 B. M., from Shortland Id., Solomons.

One specimen, No. 1582 B. M., from Raiatea, Society Ids.

Seven specimens, Rarotonga, Cook Ids., Nos. 1944*, 1945*-1950 B. M.

Two specimens, Nos. 2281-2282 B. M., from Nukuhiva, Marquesas Ids.

Two specimens, Nos. 2487*-2488* B. M., from Makatea, Paumotu Ids.

FAMILY SYNGNATHIDÆ.

Corythroichthys waitei Jordan & Stark's MS.

One specimen, No. 1035 B. M., from Fatè, New Hebrides. The description of this species will appear in the report on the fishes of Samoa.

Corythroichthys sealei Jordan & Stark's MS.

One specimen, No. 1033 B. M., from Fatè, New Hebrides. The description of this species will appear in the report on the fishes of Samoa.

Trachyrhamphus species.

One specimen, No. 2283 B. M., from Marquesas Ids. This specimen is badly damaged, only the anterior half of the fish remaining, so the identification is quite problematic. It is allied to *T. longirostris* Kaup.

Interorbital space equal to eye, 5 in snout; a distinct ridge across opercle, with fine radiating ridges; occiput and neck with a median ridge; body deeper than broad.

This is probably a new species, but with the mutilated specimen before me the description could not be complete.

FAMILY SPHYRÆNIDÆ.

Sphyræna obtusata Cuvier & Valenciennes.

Six specimens, Nos. 911-914, 1084 and 1064 B. M., from Fatè, New Hebrides.

Sphyræna goodingi[4] Seale, new species.

Depth 7.89; head 3 in length; eye 6.20; D. v, 10; A. 10; scales 127.

Body elongate, rounded; head conical, the sharp point of the cone formed by the lower jaw; snout 2.30; lower jaw 1.60 in head; maxillary not quite reaching to anterior line with eye; teeth of the upper jaw in a single row; teeth of the lower jaw in a single row of 15 on each side; a pair of enlarged canine-like teeth in front; a row of large shark-like teeth on palatines; gill rakers short and tooth-like; opercles with the margin rounded, and ending in an oblique flap, there is an inconspicuous flat spine on the hardened portion; the upper fourth only is scaled; preopercle entirely scaled, the scales extending to below the eye onto the orbitals and on the base of the lower mandible; spinous dorsal fin, and the ventrals, are of equal length, 3.75 in head; origin of dorsal is slightly posterior to base of ventrals, the longest dorsal spine 3.80 in head; the distance between the soft and spinous dorsal 3.75 in length; last ray of dorsal extending as a short filament equal in length to width of eye; base of soft dorsal equal in length to base of anal, the last ray of anal is slightly prolonged; pectorals reaching to a line with base of dorsal, its length 3 in head; caudal deeply and evenly forked.

Color uniformly silvery with a slight wash of bluish on the dorsal surface.

One specimen from Nukuhiva, Marquesas Ids. Length 21 in. No. 2112 (Fig. 4) B. M.

FAMILY POLYNEMIDÆ.

Polydactylus plebeius Broussonnet.

Depth 3.90; head 3.25; eye 4, entirely covered with adipose membrane; D. VIII, 13; A. II, 12; five pectoral appendages; scales 60; interorbital 4.

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[4] Named for Mr. Vic Gooding of Tahiti, whose kind assistance and interest in my work was greatly appreciated.

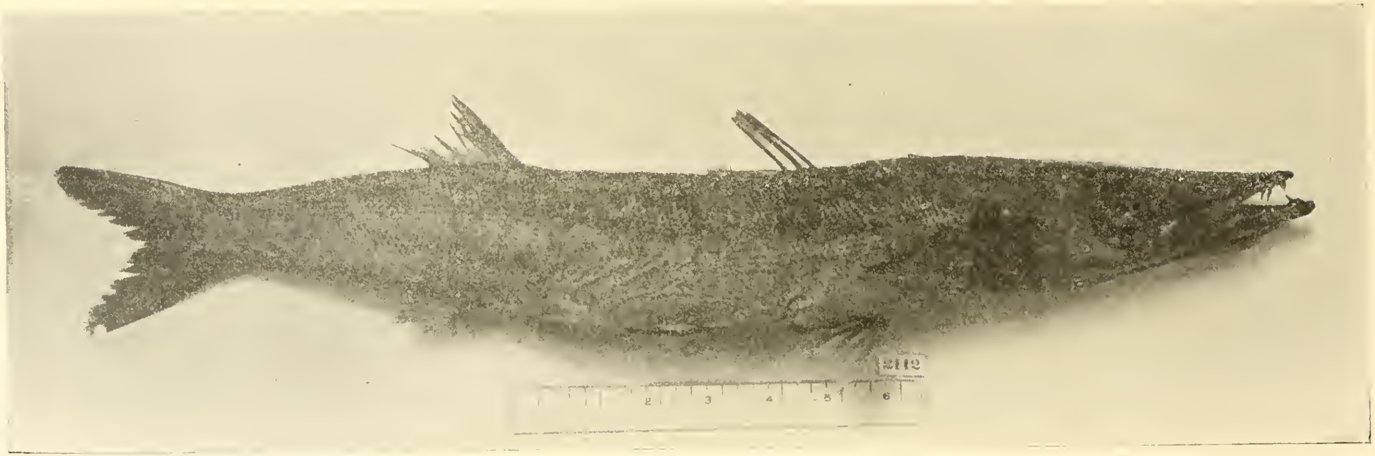
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FIG. 4.—2112. Sphyræna goodingi Seale.

Body elongate, compressed, covered with small ctenoid scales; lateral line complete; depth of caudal peduncle 2.50 in head; the head is conical, the snout prominent and pointed, extending beyond the inferior mouth; maxillary reaching to posterior of eye, its length 2 in head; mandible 2.10 in head; lips thin; teeth filliform in jaws, vomer, palatine and pterygoids; preopercle serrated; pectoral appendages long, the longest 2.75 in length of fish, without caudal. Fins: Soft dorsal and anal of about equal length, their posterior margins emarginate, longest dorsal spine equal to length of pectorals 1.50 in head; ventrals equal to base of anal, 2.10 in head; caudal deeply forked, the lobes equal.

Color in spirits is yellowish white, with about 8 narrow longitudinal lines on the sides above the lateral line, and 10 below it; fins dusky, the dorsal, pectoral and caudal tipped with black.

One specimen from Tahiti, Society Ids., No. 1354 B. M.

Three specimens from Nukuhiva, Marquesas Ids., Nos. 2274-2276 B. M.

FAMILY ANOMALOPIDÆ.

Anomalops palpebratus (Boddaert).

One specimen, No. 928 B. M., from Fatè, New Hebrides.
One specimen, No. 1995 B. M., from Rarotonga.

FAMILY HOLOCENTRIDÆ.

Holocentrus spinifer Forskal.

Two specimens, Nos, 955 and 1003 B. M., from Fatè, New Hebrides.

One specimen, No. 1287 B. M., from Shortland Id., Solomons.
One specimen, No. 1619 B. M., from Raiatea, Society Ids.

Holocentrus ensifer Jordan & Evermann.

One specimen, No. 818 B. M., from Mangareva, Gambier Ids., is referred to this species. Length 13.50 in. Dorsal a uniform deep crimson.

Holocentrus lacteoguttatus Cuvier & Valenciennes.

Four specimens, Nos. 875, 1006, 1007 and 1008 B. M., from Fatè, New Hebrides, are referred to this species, with some doubt.

Holocentrus praslin (Lacépède).

One specimen, No. 2005* B. M., from Fatè, New Hebrides.

Holocentrus tiereoides (Bleeker).

One specimen, No. 957* B. M., from Fatè, New Hebrides.
One specimen, No. 1248 B. M., from Shortland, Solomons.
Seven specimens, Nos. 1461-1466, 1493 B. M., from Tahiti.

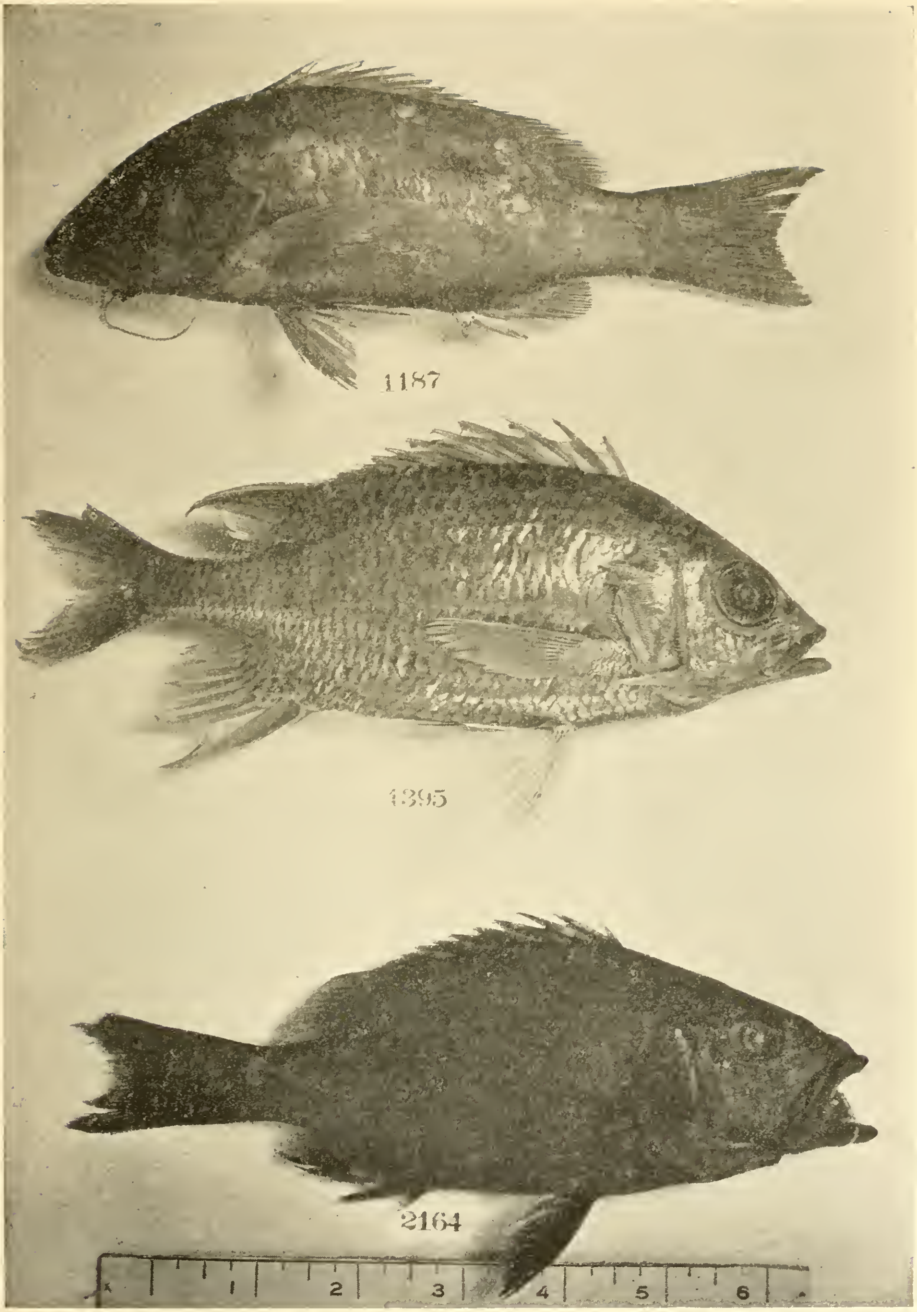
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FIG. 5.—1187. Lutianus melanesiæ Seale. 1395. Holocentrus rubellio Seale. 2164. Lutianus nukuhivæ Seale

Holocentrus rubellio Seale, new species.

Depth 2.75; head 3; eye 3.20 in head; D. XI, 14; A. IV, 9; scales 4-40-7; interorbital 4.90 in head, 1.40 in eye.

Body compressed, oblong, rather deep; caudal peduncle 1.85 in head, its depth 2 in its length; scales smooth except at edges which are finely toothed; a row of modified scales on nuchal region; some enlarged scales at base of anal fin; head compressed, rather short, its depth 1.15 in length; snout short, straight, the upper processes of the intermaxillaries end in a line with anterior margin of orbit; lower mandible two in head; posterior end of maxillary reaching to anterior edge of pupil; broad bands of villiform teeth on jaws, vomer and palatines; gill-rakers rather long, 12 on lower limb; opercles striate and toothed, two flat spines at angle, the upper slightly the longest; the large spine at angle of preopercle greater than width of orbit, 2.75 in head; orbital bones well toothed and spined, a strong spine extending over premaxillary, another on line with anterior margin of pupil, and 5 smaller ones between these two. Fins: dorsal spines rather strong, the fourth the longest, 2 in head; third anal spine very long and strong, 1.19 in head; pectorals reaching to line with fifteenth scale of lateral line; ventrals 1.20 in head; caudal moderately forked, the lobes equal.

Color in life, pink; fins pink, the webs along the spines a deeper red, this color becoming wider at the top, giving the appearance of a deeper red margin to the dorsal.

Color in spirits, yellowish white, with 10 pale yellow longitudinal lines; fins all yellowish white.

One specimen, No. 1395 (Fig. 5) B.M., from Tahiti, Society Ids.

Holocentrus verticalis Seale, new species.

Depth 2.75; head 3; eye 4.50; scales 4-47-8; D. XI, 15; interorbital 7.50 in head, 1.55 in eye.

Body compressed, oblong, deep; caudal peduncle 2 in head, its depth 1.90 in length. Head compressed, slightly longer than deep, the upper outline slightly concave; groove for the intermaxillary reaching to a line with anterior margin of pupil; lips thick; mandible 1.85 in head; maxillary short, not reaching to anterior margin of iris; bands of minute teeth on jaws, vomer and palatines; gill-rakers not long, 10 on lower limb; orbital bones with numerous spines and teeth; opercle striate and toothed, two rather prominent spines at angle, the upper slightly the longest, 1.20 in pupil; preorbital well toothed and scaled, the large spine at angle much longer than diameter of eye, 3 in head; just below this spine are 4 prominent teeth. Dorsal spines rather strong, the third the longest, 2 in head; rays of soft dorsal 1.90 in head; external rays of soft dorsal and anal slightly prolonged; third anal spine strong, 2.10 in head; pectorals reaching to a line with thirteenth scale of

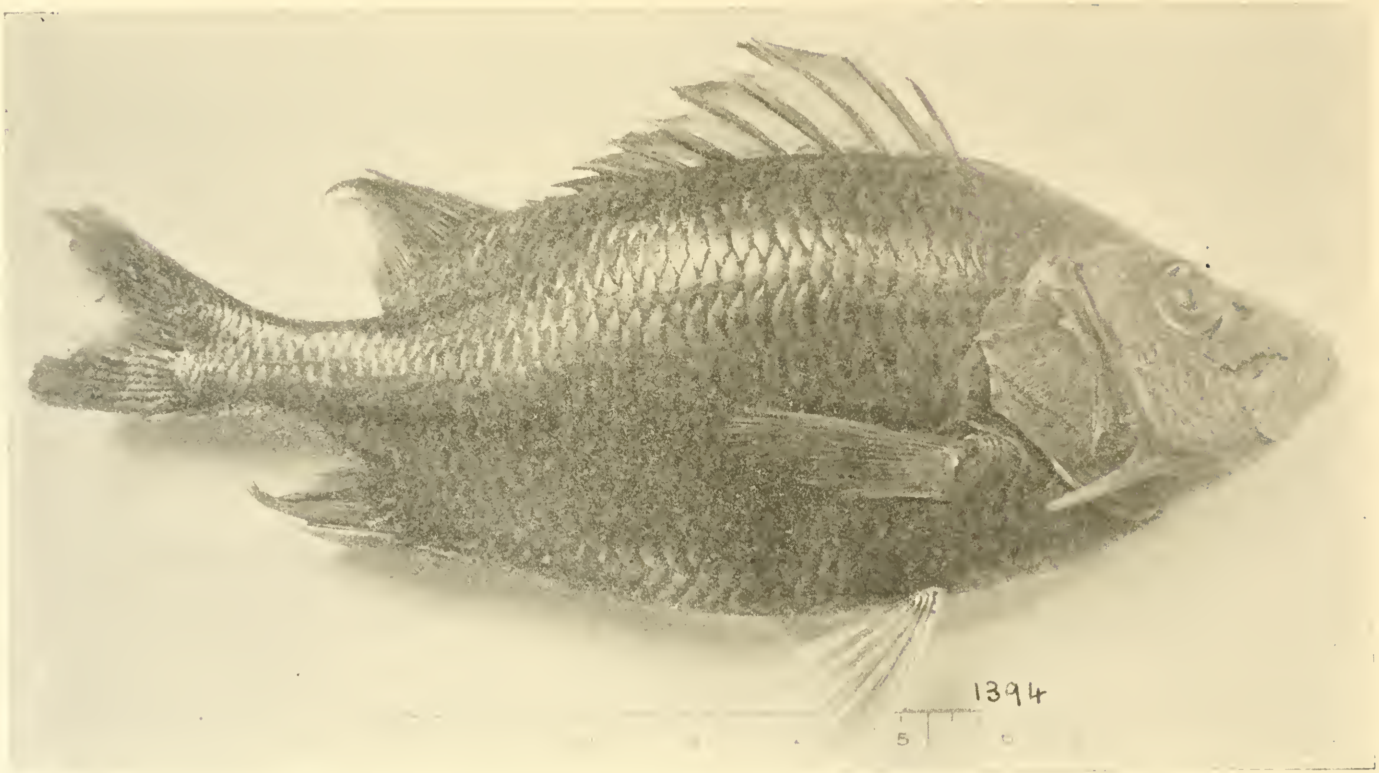

FIG. 6.—1394. Holocentrus verticalis Seale.

lateral line, 1.55 in head; caudal moderately forked, the lobes equal.

Color in life is bright red, each scale with a silvery vertical line through the centre; a white line under each eye and posterior edge of preopercle; dorsal fin uniform deep crimson; crimson in axis of pectorals; the remaining fins all pink with a wash of orange.

Color in spirits, yellowish white, with 13 darker yellow longitudinal stripes; dorsal fins yellowish, the other fins pinkish white.

Five specimens, Nos. 701*, 1391-1394, B. M., from Tahiti, Society Ids. No. 1394 (Fig. 6) is type of the species.

Holocentrus diadema Lacépède.

Three specimens from Tahiti, Nos. 1458, 1459 and 1513* B. M.

Three specimens, Nos. 879, 878 and 2279 B. M. from Fatè, New Hebrides.

One specimen, No. 2279* B.M., from Nukuhiva, Marquesas Ids.

Holocentrus microstomus Günther.

Nine specimens, Nos. 1340, 1467-1472 B. M., from Tahiti.

Four specimens, Nos. 1608-1611 B. M., from Raiatea, Society Ids.

Two specimens, Nos. 732 and 761 B. M., from Tubuai, Austral Ids.

Two specimens, Nos. 1972-1973 B. M., from Rarotonga, Cook Ids.

Holocentrus tiere Lesson.
(*Holocentrum poecilopterum* Bleeker.)

Four specimens, Nos. 1396-1399 B. M., from Tahiti.

Holocentrus opercularis Cuvier & Valenciennes.

One specimen, No. 1456 B. M., from Tahiti.

Holocentrus punctatissimus Cuvier & Valenciennes.
(*Holocentrum diploxiphus* Günther.)

Six young specimens, No. 767 B. M., from Tubuai, Austral Ids.

One specimen, No. 819 B. M., from Mangareva, Gambier Ids.

Two specimens, Nos. 1969-1970 B. M., from Rarotonga, Cook Ids.

Two specimens, Nos. 877, 950* B. M., from Fatè, New Hebrides.

Two specimens, Nos. 2485*-2486* B. M., from Makatea, Paumotu Ids.

One specimen, No. 1286 B. M., from Shortland Id., Solomons.

Holocentrus sammara (Forskal).

Four specimens, Nos. 1457, 1510, 1528 and 1529 B. M., from Tahiti.

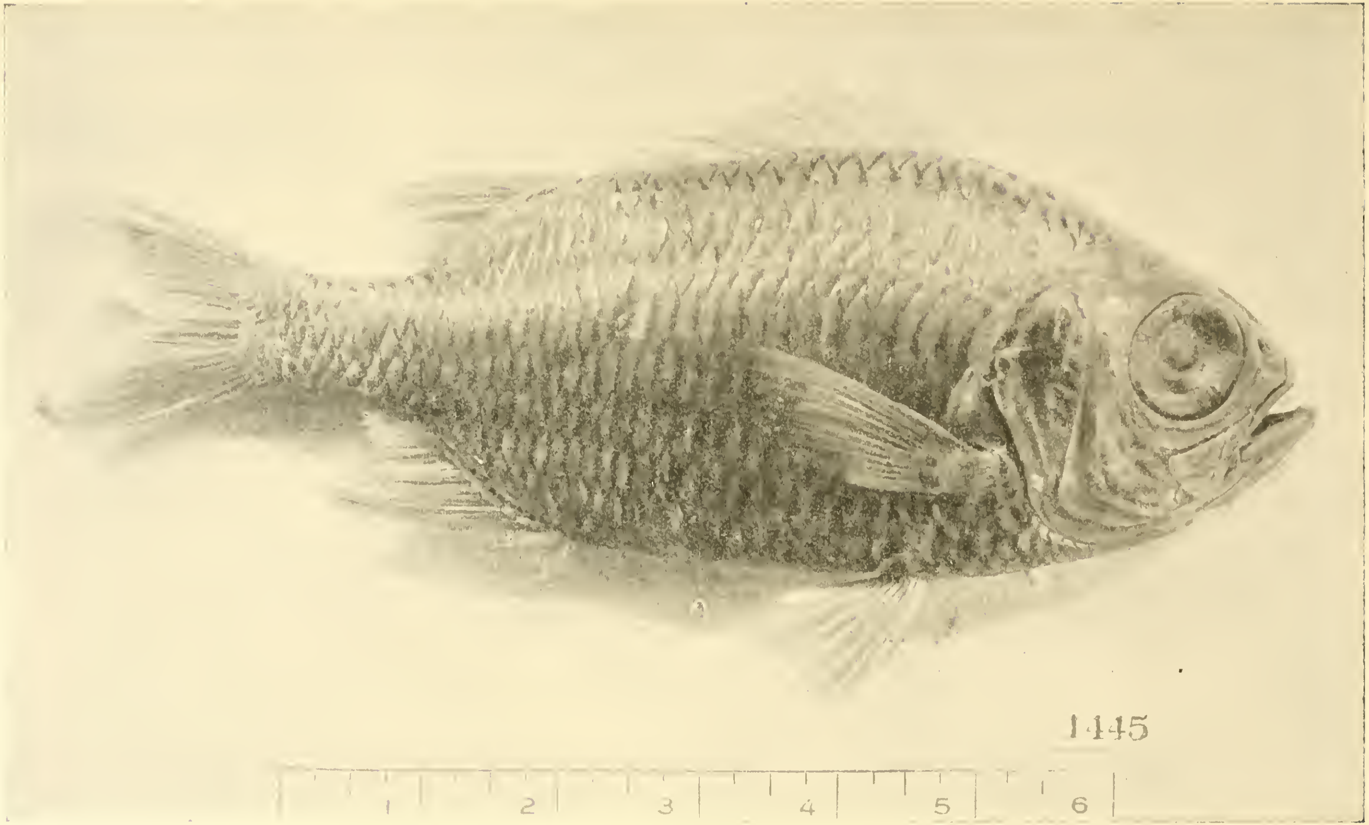
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FIG. 7.—1445. Myripristis sanguineus Seale.

One specimen, No. 1328 B. M., Shortland Id., Solomons.

Five specimens, Nos. 1603-1607 B. M., from Raiatea, Society Ids.

One specimen, No. 1971 B. M., from Rarotonga, Cook Ids.

Two specimens, No. 2277-2278 B. M., from Nukuhiva, Marquesas Ids.

Myripristis sanguineus Jordan & Seale, new species.

Head 3.4; depth 2.50; eye 2.50 in head; D. x-1, 14; A. IV, 13; scales 4-38-7.

Body elongate, deep and compressed; head blunt, its length less than its depth; snout short, its length from the upper nostril equal to pupil; premaxillary slightly protracted; maxillary reaching to a line below the posterior edge of pupil, its distal end broad, 4.50 in head, its lower posterior margin armed with blunt teeth; lower mandible 1.50 in head; bands of small teeth in jaws, vomer and palatins; a patch of enlarged blunt outer teeth on each side of upper and lower jaw; gill-rakers numerous, long and strong; interorbital space 3.85 in head; opercles striate, and denticulate, with one small spine at angle; scales all striate and toothed; a row of modified scales over the nuchal region; origin of dorsal about even with base of ventrals and on line with the third scale of the lateral line; dorsal spines slender, the first 2.75 in head; the third is the longest, 2 in head; anterior dorsal and anal rays somewhat produced, their length 1.50 in head; the third anal spine the strongest, the fourth the longest being equal to orbit; caudal emarginate; pectoral reaching to the eleventh scale of the lateral line.

Color in life red, a black opercular spot; fins all red, the dorsal a pale red with the margin a deep crimson; the outer margin of the soft dorsal and the anal are also a darker red.

Color in spirits, pale yellowish, the fins are a brighter yellowish; a dusky blotch at posterior margin of opercles.

Two specimens, Nos. 1445 (Fig. 7) and 1446 B. M., from Tahiti, Society Ids. Another, the type of the species, was taken by Jordan & Kellogg at Apia, Samoa.

Myripristis adustus Bleeker.

Two specimens, Nos. 1447 and 1448 B. M., from Tahiti.

One specimen, No. 1195* B. M., from Shortland Id., Solomons.

Myripristis murdjan (Forskal).

One specimen, No. 1618 B. M., from Raiatea Id., Society Ids.

Two specimens, Nos. 1967 and 1968 B. M., from Rarotonga.

Five specimens, Nos. 1473-1476 and 1538 B. M., from Tahiti.

Four specimens, Nos. 996, 1000*, 982 and 976 B. M., from Fatè, New Hebrides.

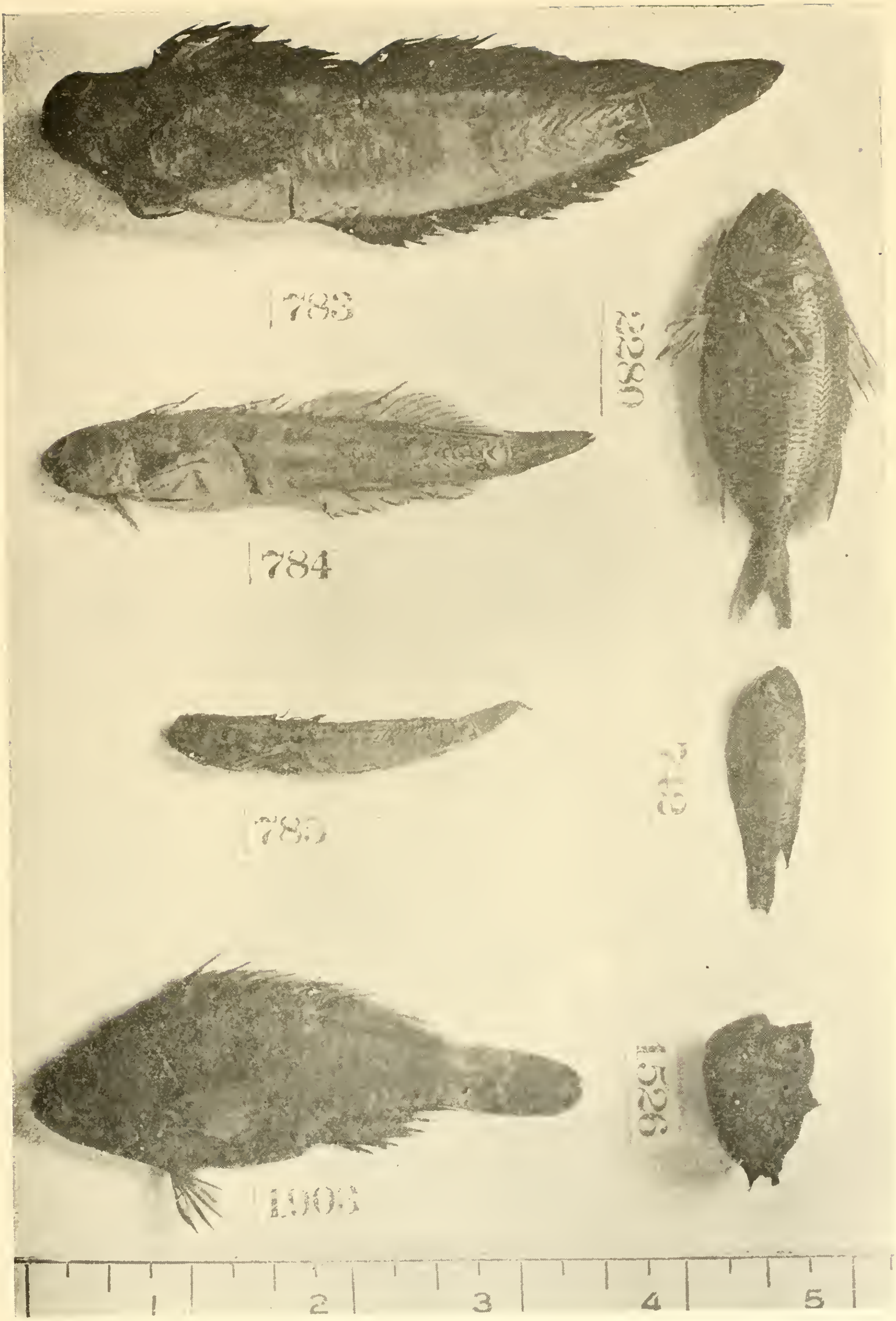
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FIG. 8.—783. Salarias azureus Seale. 784. Salarias tubuensis Seale. 785. Salarias cæsius Seale. 1903. Scarichthys rarotongæ Seale. 2280. Myripristis phæopus Seale. 742. Abudefduf cæsio Seale. 1526. Ostracion dexteri Seale.

Myripristis microphthalmus Bleeker.

Two specimens, Nos. 937 and 1004 B. M., from Fatè, New Hebrides.

Myripristis phæopus Seale, new species.

Depth 2:70; head 2.10; eye 2.50; interorbital 3; D. x, I, 16; A. III, 15; lateral line 44.

Body oblong, compressed; caudal peduncle, and the caudal fin small, the depth of the peduncle being one half of eye; snout extending somewhat over the mouth, the upper jaw being the longest; maxillary extending to the posterior margin of iris, its length 2.10 in head; bones of the head denticulate, the posterior margin of the opercles and preopercles with small teeth or spines; modified scales about the eye give the orbital margin a scalloped appearance; teeth small; the second and third dorsal spines are the longest, 1.50 in head; caudal small and short, its longest ray 1.50 in head; second anal spine is the longest, 2.50 in head; ventrals 1.50 in head; pectorals 1.60 in head.

Color in spirits, pinkish white without stripes; spinous dorsal dusky; ventrals broadly tipped with black; soft dorsal anal, pectorals, and caudal pinkish white.

One specimen, No. 2280 (Fig. 8) B. M., from Nukuhiva, Marquesas Ids. Length 2.50 in.

Family GEMPYLIDÆ.

Promethichthys pacificus Seale, new species.

Depth at origin of dorsal 2.50 in head, at origin of anal and soft dorsal 2.30, at tenth dorsal spine 2; head 3.75; eye 3.90 in head; snout 2.76; D. XVIII, 20, II; A. 18, II; lateral line continuous, with a big oblique curve downwards under the anterior end of dorsal; interorbital space with membrane, 1 in eye.

Body elongate, slender, covered with delicate scales, the scales also covering the head including the upper part of snout, maxillary, chin, and opercles; head compressed, the interorbital space flat, with a shallow groove; lower jaw extending slightly beyond the upper; the premaxillary reach to a line with the anterior margin of iris, the exposed length 3.20 in head, the width of the distal end is about equal to iris; mandible 1.90 in head; four long fang-like teeth in the upper jaw, with three smaller depressible ones near their bases, and a single row of 16 strong compressed triangular teeth in each side of the upper jaw; lower jaw with a single row of 10 similar teeth on each side, the two anterior teeth being separate, larger and fang-like; no teeth on vomer; a single row of fine teeth on the palatine; gill-rakers obsolete on anterior half of the lower limb, but with about 12 small rakers similar to the teeth on posterior half of the limb; eye large; opercles scaled, but without spines; origin of the dorsal fin is directly over the origin of pecto-

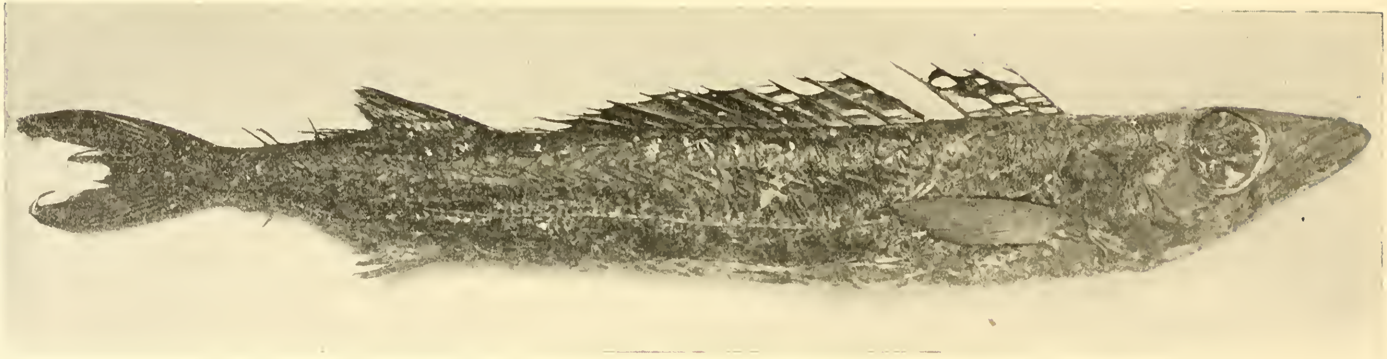


FIG. 9.—1358. Promethichthys pacificus Seale.

rals; length of eighth dorsal spine 3 in head; the longest soft dorsal ray 2.80 in head; base of anal 2.20 in head; the ventrals are represented by two minute spines just below the base of the pectorals, the length of these spines is less than one-half the distal width of the maxillary; pectorals 1.75 in head, the upper margin of their base on plane with the lower margin of orbit; caudal deeply forked, the lobes equal, their longest ray equal to the length of the pectorals.

Color, a sepia brown; webs of the spinous dorsal black; soft dorsal, anal, and caudal yellowish white with a slight wash of dusky; pectorals yellowish white anteriorly, their tips black.

One specimen, length 24 in., No. 1358 (Fig. 9) B. M., from Tahiti.

FAMILY SCOMBRIDÆ.

Scomber microlepidotus Rüppel.

Two specimens, Nos. 1130 and 1291 B. M., from Shortland, Solomons.

Two specimens, No. 849 and 845* B. M. from Fatè, New Hebrides.

Color in life, silvery, with wash of greenish, and having obsolescent reflection, about 6 darker greenish or yellowish lines from head to caudal; top of head green.

FAMILY CARANGIDÆ.

Scombroides sanctipetri (Cuvier & Valenciennes).

Two specimens, Nos. 1508, 1509 B. M., from Tahiti.

Elagatis bipinnulatus (Quoy & Gaimard).

One specimen of this species was secured in Shortland, Solomon Ids. Length 23.50 in. No. 1209 (Fig. 10) B. M. It is very common and is much used as food.

Depth 4.90; head 4; eye 6.40; interorbital 3; snout 2.50; D. VI, I, 25, 2; A. II, 18, 2.

Trachurops crumenophthalmus (Bloch).

One specimen, No. 1378 B. M., from Tahiti.

Seven specimens, Nos. 986, 988, 1031, 1032, 1034, 1058 and 1059 B. M., from Fatè, New Hebrides.

Four specimens, Nos. 1127, 1128, 1129 and 1292* B. M., from Shortland Id., Solomons.

One specimen, No. 1992 B. M., from Rarotonga, Cook Ids.

One specimen, No. 2270 B. M., from Nukuhiva, Marquesas Ids.

Caranx forsteri Cuvier & Valenciennes.

Two specimens of the common "Ulua," No. 1376-1377 B. M., from Tahiti.

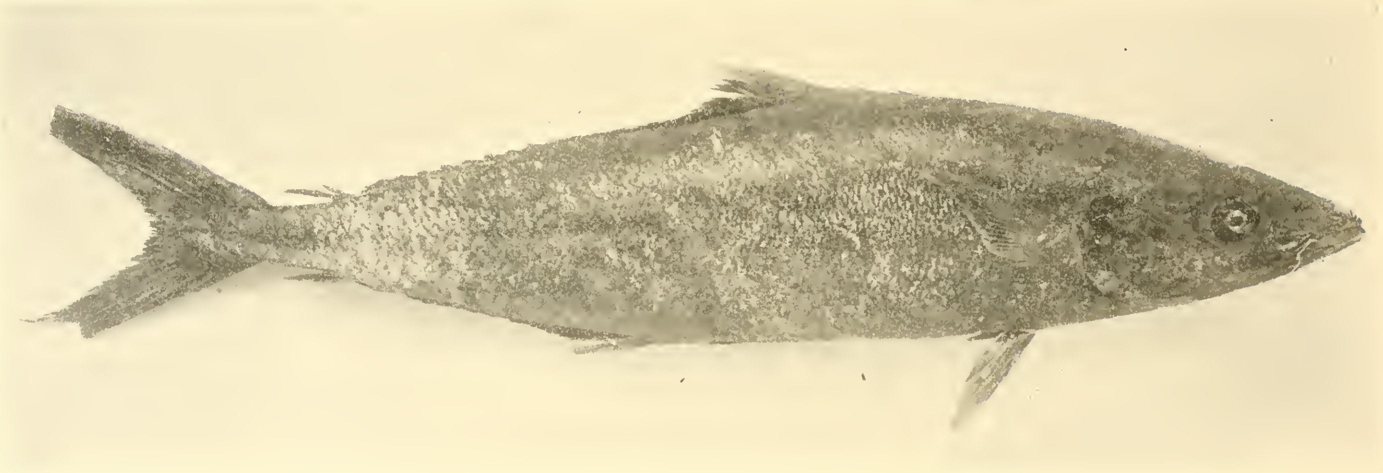


FIG. 10.—1209. Elagatis bipinnulatus (Quoy & Gaimard).

Caranx lugubris Poey.

One specimen, No. 1991 B. M., Rarotonga, Cook Ids.

Four specimens, Nos. 2266-2269 B.M., from Nukuhiva, Marquesas Ids.

One specimen, No. 1274 B. M., from Shortland, Solomons.

One specimen, No. 1407 B. M., from Tahiti.

Caranx melampygus (Cuvier & Valenciennes).

Depth 2.75; head 3.50; eye 4, a posterior adipose lid; scutes 34; D. VII, 22; A. I, 19; interorbital space 3.50.

Body oblong, compressed, the back evenly curved. Head compressed, mouth low, oblique, the lower jaw slightly projecting; maxillary scarcely reaching to below anterior margin of eye; teeth of upper jaw in villiform bands, with an outer row of larger canine-like teeth; lower jaw with a single row of small teeth; teeth on vomer, palatine, and tongue; breast and cheeks scaly; lateral line arched, becoming straight under the fifth dorsal ray; a recumbent spine under the skin; soft dorsal and anal fins similar, falcate in front, the dorsal the highest; pectorals 3 in length of head and body; ventrals short, 2 in head; caudal well forked, the lobes equal.

Color in spirits, olivaceous, bluish above, opercular spot obsolete; caudal, dorsal, and anal tipped with dusky.

Three specimens from Tubuai Ids., of Austral Group, Nos. 742*, 780, 782 B. M.

Two specimens, Nos. 1212 and 1213* B. M., from Shortland, Solomon Ids.

One specimen, No. 2271 B.M., from Nukuhiva, Marquesas Ids.

Three specimens, Nos. 947, 943 and 948 B. M., from Fatè, New Hebrides.

FAMILY PEMPHERIDÆ.

Pempheris mangula Cuvier & Valenciennes.

One specimen, No. 1511 B. M., from Tahiti.

FAMILY APOGONICHTHYIDÆ.

Amia amboinensis Bleeker.

One specimen of this species was taken at Shortland Id., Solomons, No. 1307 B. M.

Color in life, pale yellow, with two bright yellow stripes, made up of round dots, along the sides; four golden dots on opercles; fins all yellowish; eye blue, with narrow blue line from eye around tip of snout.

Amia novemfasciata (Cuvier & Valenciennes).

Two specimens, Nos. 985 and 1016* B. M., from Fatè, New Hebrides.

Color in life, silvery, with broad longitudinal streaks of brown which converge on the caudal; fins pinkish.

Amia aroubiensis (Hombron & Jacquinot).

Two specimens taken on the reef at Papeete, Tahiti. Nos. 1674 and 1675 B. M.

Three specimens, Nos. 793, 794, 795 B. M., from Tubuai, Austral Ids.

One specimen, No. 1306 B. M., from Shortland Id., Solomons.

One specimen, No. 2254 B. M., from Nukuhiva, Marquesas Ids.

Amia savayensis (Günther).

The following specimens of this species were secured:—

Nos. 1017 and 1029 B. M., from Fatè, New Hebrides.

Nos. 1156*, 1160, 1198, 1145*, 1186*, 1153 B. M., from Shortland Ids., Solomons.

Nos. 1660-1666 B. M., from Raiatea, Society Ids.

Pristiapogon koilomatodon (Bleeker).

Two specimens, Nos. 1191 and 1192 B. M., from Shortland Id., Solomons.

Color in life, a pale pinkish with short, dark lines; fins all pinkish.

Pristiapogon snyderi Jordan & Evermann.

Depth 3; head 2.75; eye 3.75; interorbital 4.5; D. VII-I, 9; A. II, 8; scales 2-25-5.

Color in spirits, pinkish brown, a brown longitudinal stripe from snout to caudal, a brown spot on base of caudal peduncle at base of caudal; fins yellowish, anal with a dusky line at base; caudal with the outer rays dusky; spinous dorsal with a dusky line at base; soft dorsal with a dusky line on 1-3 webs; ventrals with dusky on anterior webs.

Four specimens from Tubuai, Austral Ids. Nos. 776-779 B. M. Lengths 2.50-5 in.

One specimen, No. 915 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 1193 and 1282 B. M., from Shortland Id., Solomons.

Two specimens, Nos. 1667-1668 B. M., from Raiatea, Society Ids.

Paramia quinquelineata (Cuvier & Valenciennes).

Five specimens, Nos. 1669-1673 B. M., from Raiatea, Society Ids.

One specimen, No. 2257 B. M., Nukuhiva, Marquesas Ids.

FAMILY KUHLIIDÆ.

Kuhlia malo (Cuvier & Valenciennes).

Depth 2.85; head 3.30; eye 3; D. x, 11; A. III, 11; interorbitals 3.50; scales 6-54-14.

Body oblong, strongly compressed, scaled; head compressed; eyes large; mouth large, protractile, the lower jaw the longest; nuchal region, cheeks and opercles scaled; snout about equal to eye; maxillary exposed, without a supplemental bone, its distal end on a line with anterior of eye; teeth villiform in jaws, vomer, palatines, entopterygoids and ectopterygoids; six branchiostegals; pseudobranchiæ present; 24 gill-rakers on lower arch; opercles with 2 spines; caudal peduncle long, its depth 2 in length. Fins: dorsal notched, the fifth spine the longest, 3.50 in head; ninth spine much shorter than tenth; longest ray equal to fifth spine; base of anal equal to head; pectorals 1.50 in head; ventrals 1.75 in head; caudal deeply forked, the lobes equal.

Color silvery, the spinous dorsal and caudal tipped with dusky; the soft dorsal with a dusky submarginal patch, and a narrow margin of white.

Three specimens from Tubuai, Austral Ids., Nos. 737, 736, 738 B. M.

One specimen, No. 1537 B. M., from Tahiti.

One specimen, No. 2471* B. M., from Makatea, Paumotu Ids.

Kuhlia tæniura (Cuvier & Valenciennes).

Three specimens, Nos. 870, 871 and 1020 B. M., from Fatè, New Hebrides,

FAMILY SERRANIDÆ.

Cephalopholis argus (Bloch).

Four specimens, Nos. 696*, 697*, 1428 and 1429 B. M., from Tahiti, Society Ids.

One specimen, No. 773 B. M., from Tubuai, Austral Ids.

One specimen, No. 1998* B. M., from Rarotonga, Cook Ids.

One specimen, No. 799* B. M., from Mangareva.

Two specimens, Nos. 2165-2166 B. M., from Nukuhiva, Marquesas Ids.

Two specimens, Nos. 1238 and 1264 B. M., from Shortland Id., Solomons.

These specimens correspond in every respect with the description and with Bleeker's figure, Atl. Icth. Tab. CCCXX, fig. 3.

Cephalopholis urodelus (Cuvier & Valenciennes).

Color in life, red, with two oblique white bands on caudal. One specimen shows some indistinct white dots over the body. No. 835 has a dark spot on the opercles; the others have not.

Two specimens, Nos. 835 and 817 B. M., from Mangareva.

Cephalopholis miniatus (Rüppell).

Two specimens, Nos. 1244 and 1265 B. M., from Shortland Id., Solomons.

Color in life, red, with blue spots; dorsal, anal and caudal red, with blue dots; eyes red.

Variola louti (Forskal).

One specimen, No. 843* B. M., from Fatè, New Hebrides.

Paracanthistius maculatus (Cuvier & Valenciennes).

One specimen, No. 844* B. M. (a head). The fish was 24 in. in length; D. VII, 11; A. III, 8.

Color brownish, with ocelli showing darker edges. Fatè, New Hebrides.

Epinephelus merra (Bloch).

Four specimens from Tahiti, Society Ids., Nos. 1344, 1381, 1382 and 1383 B. M.

Four specimens, from Mangareva (Gambier Ids.), Nos. 796 797, 798 and 799* B. M.

Color in life, brown, with hexagonal spots and lines, usually without distinct markings on pectoral or ventral fins, markings on ventral surface not distinct.

Epinephelus corallicola (Cuvier & Valenciennes).

One specimen, No. 1602 B. M., from Raiatea, Society Ids.

Five specimens from Tahiti, Society Ids., Nos. 1350, 1351, 1494, 1495, 1496 B. M.

Six specimens from Shortland, Solomon Ids., Nos. 1217, 1237, 1259, 1260, 1261 and 1308 B. M.

Two specimens from Makatea, Society Ids., Nos. 2468* and 2469* B. M.

Three specimens from Rarotonga, Cook Ids., Nos. 1982-1984 B. M.

One specimen, No. 848 B. M., from Fatè, New Hebrides.

Color in life is brown, with distinct hexagonal lines which cover the entire fish, including all the fins.

Epinephelus undulosus (Quoy & Gaimard).

One specimen, No. 1257 B. M., from Shortland Ids., Solomons.

Epinephelus maculatus (Bloch).

One specimen, No. 1249* B. M., from Shortland, Solomons.

One specimen, No. 2473* B. M., from Makatea, Paumotu Ids.

Color in life is a fine dark brown, with four distinct white lines along each side of body, and one on the median line of belly;

a white line obliquely down forward from the eye; some slight white dots on chin; eye golden; fins pinkish, without spots.

Epinephelus pachycentrus (Cuvier & Valenciennes).

Two specimens, Nos. 1168 and 1169 B. M., from Shortland Id., Solomons.

Color in life is brown, with small blue dots on head; fins all dusky.

Epinephelus dæmelii (Günther).

Two specimens, Nos. 1163 and 1285 B. M., from Shortland Id., Solomons.

Color in life, dark brown, covered with hexagonal lines and spots; a deep bluish-black spot on top of caudal peduncle.

Epinephelus cæruleopunctatus (Bloch).

Two specimens, Nos. 1157 and 1247 B. M., from Shortland Id., Solomons.

Epinephelus fasciatus (Schlegel).

Depth 3.50; head 2.34; eye 5.10; interorbital equal to eye. Teeth in bands, the four anterior ones of each jaw enlarged.

Color red, with small bluish white dots; dorsal with a broad tip of black; a deep red ring about eye. In spirits the white dots disappear.

Four specimens were secured from Mangareva Id. No. 821 B. M., length 11.50 in. No. 822 B. M., length 10 in. No. 839 B. M., length 7.75 in. No. 840* B. M., length 6.50 in.

Epinephelus zapyrus Seale, new species.

Depth 3.50; head with opercular flap 2.30; eye 6.20 in snout; D. XI, 16; A. III, 8; scales small, 17-100-36; interorbital flat, slightly less than eye, equal to length of first dorsal spine, 7.50 in head.

Body elongate, compressed; head compressed, rather blunt, the lower jaw slightly the longest; mouth big, maxillary with a small supplemental bone; premaxillary 2.75 in head, their posterior margin reaching to below anterior margin of eye; lower mandible 2 in head; nostrils conspicuous, a membranous flap over the lower opening; on the upper part of the snout, midway between the pairs of nostrils are two grooves; bands of fine short teeth in jaws, vomer and palatines, the outer ones slightly enlarged, the inner ones depressible; two small canines in each jaw; sphenoid and basi pteragoid also armed with fine teeth; gill-rakers rather strong, 13 on lower limb, their inner side with clusters of short sharp teeth; opercles scaled, and having a long flap and three flat spines from posterior part, the upper spine minute, the middle one prominent; posterior margin of preopercles serrate; cheeks minutely scaled; dorsal fin continuous, not notched, the rays longer than the spines,

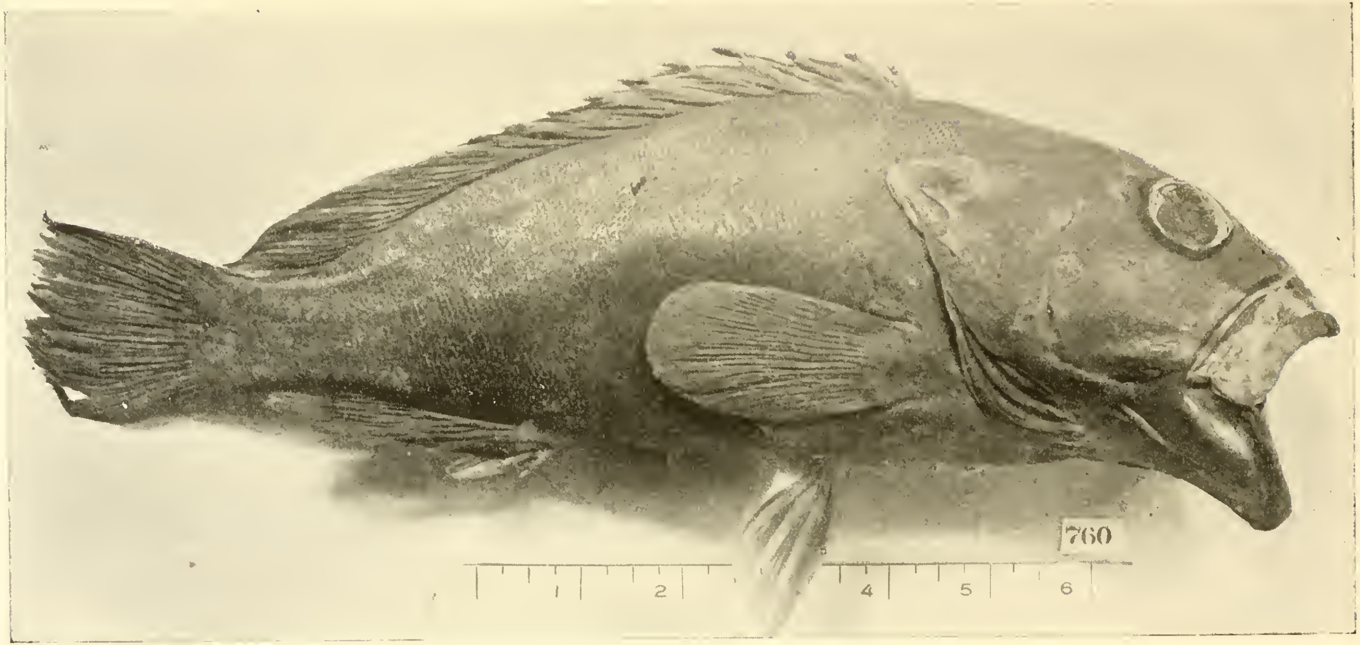


FIG. 11.—760. Epinephelus zapyrus Seale.

the fourth spine is the longest 3.90 in head, the longest ray is 2.60 in head; base of anal 3.40 in base of dorsal, the third anal spine 1.20 in base of fin; pectorals longer than ventrals, 1.20 in head, a membraneous covering over the axis; origin of dorsal and pectorals on a line and slightly anterior of ventrals whose origin is under the third dorsal spine; ventrals reaching to vent; caudal square, the middle ray 2.16 in head.

Color in life, a uniform scarlet vermilion, the fins tipped with orange, the spinous dorsal with a tip of deep crimson.

Color in formalin, pinkish white, the dorsal with tip of indian red, a dusky ring around orbit; fins yellowish white.

One specimen, No. 761 (Fig. 11) B. M. Length 12.50 in. From Tubuai Ids.

Grammistes sexfasciatus (Bloch).

Depth 2.75; head, without flap, 3; eye 4; D. VII, I, 14; A. II; scales minute, enveloped in the epidermis; interorbital equal to snout, 5.50 in head.

Body oblong, compressed, a slight dip in the profile above orbit; lateral line complete; caudal peduncle very little longer than deep; head compressed, conical; branchiostegals 7; a rudimentary barbule under chin; premaxillary reaching past the orbit, its length 1.90 in head; villiform teeth in jaws, vomer and palatine; preopercle with a small spine, three larger spines on the opercle; soft dorsal, anal and caudal fins rounded; pectorals and ventrals of about equal length, 1.90 in head, and equal in length to mid-ray of caudal.

Color in spirits, brown, with six yellowish white longitudinal bands, three of which are especially prominent; fins yellowish white, except the spinous dorsal, which is dusky.

One specimen, No. 1343 B. M., from Tahiti.

One specimen, No. 1249* B. M., from Shortland Id., Solomons.

One specimen, No. 2255 B. M., from Nukuhiva, Marquesas Ids.

Pharopteryx nigricans Rüppell.

Two specimens, Nos. 1158 and 1201 B. M., from Shortland Id., Solomons.

FAMILY PRIACANTHIDÆ.

Priacanthus hamruhr (Forskal).

Two specimens, Nos. 1266 and 1267* (Fig. 12) B. M., from Shortland Id., Solomons.

Priacanthus cruentatus (Lacépède).

Two specimens, Nos. 1415 and 1450 B. M., from Tahiti.

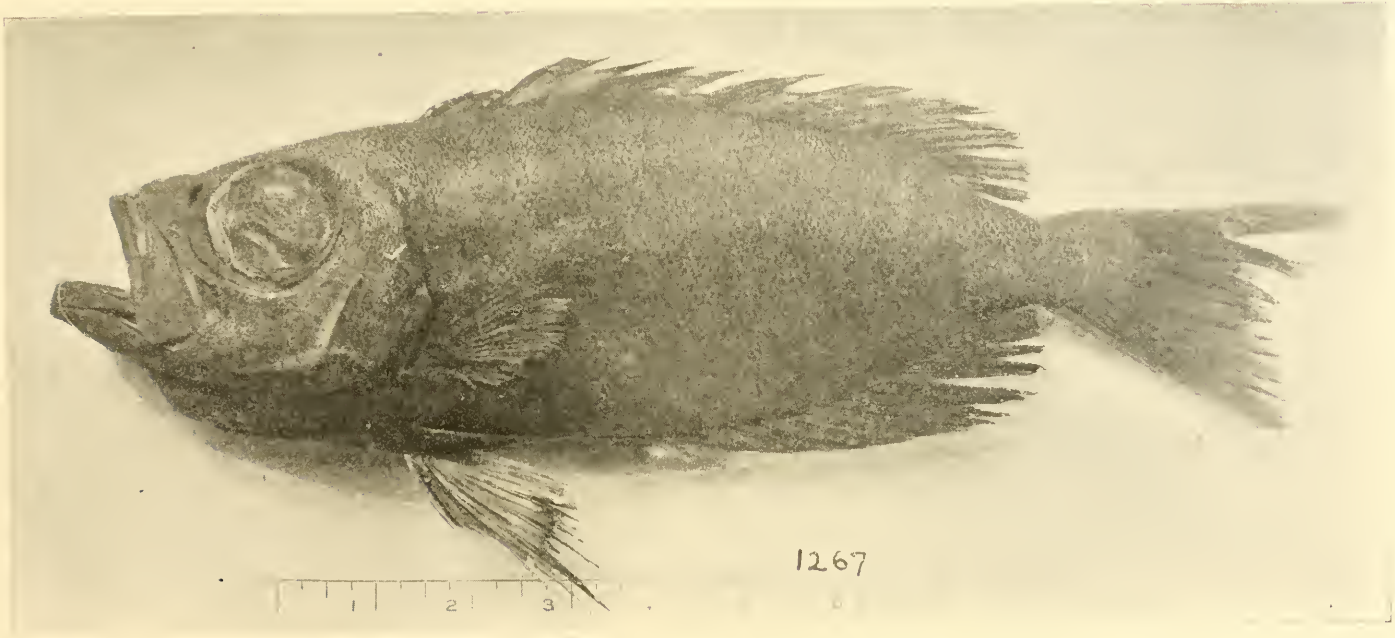


FIG. 12.—1267. Priacanthus hamruhr (Forskal).

FAMILY LUTIANIDÆ.

Lutianus monostigma (Cuvier & Valenciennes).

One specimen, No. 744 B. M., from Tubuai, Austral Ids.

Two specimens, Nos. 842* and 1077* B. M., from Fatè, New Hebrides.

One specimen, No. 2236 B. M., from Marquesas Ids.

Lutianus fulvus (Bloch).

Two specimens, Nos. 1431 and 1432 B. M., from Tahiti.

Lutianus nukuhivæ Seale, new species.

Depth 2.75; head 2.75; eye equal to interorbital, 4 in head; D. XI, 14; A. III, 8; scales small, 73 in lateral line.

Body oblong, compressed, lateral line complete; head conical, mouth large, maxillary reaching to line with anterior of eye; small teeth in jaws, vomer and palatines, two small curved canines in anterior of each jaw; posterior margin of preopercle with fine teeth, a distinct notch above the angle which receives the large notch of the interoperculum; no spines on the opercles; cheeks and opercles scaled; fourth dorsal spine the longest, 2.50 in head; ventrals 1.75 in head; pectorals 1.20; caudal emarginate.

Color in spirits: the anterior two-thirds of the body is dusky brown, the centre of the scales lighter, giving the appearance of narrow longitudinal streaks; posterior third of the body, including caudal, from a line with eighth dorsal ray and third anal ray, yellow; spinous dorsal, ventrals, spinous anal and anterior half of the soft dorsal and anal dusky; pectorals, caudal, posterior two-thirds of soft dorsal and soft anal yellow; the caudal has a dusky intermarginal wash on its upper and lower rays; axis of the pectoral and a line on its base dusky.

One specimen, No. 2164 (Fig. 5) B. M., from Nukuhiva, Marquesas Ids.

Lutianus tahitiensis Seale, new species.

Depth 2.75; head 2.75; eye 3.85 in head; D. X, 15; A. III, 9; scales in lateral line 79; interorbital 4.85 in head.

Body oblong, compressed, the upper outline quite convex; scales small, in oblique lines; caudal peduncle 2 in head. Head compressed, conical, the profile from nuchal region to tip of snout straight; snout 2.80 in head; lips rather thin; mandibles 2.20 in head; maxillary not reaching the anterior margin of orbit by the width of the pupil; all but the tip of the maxillary hidden under the wide preorbital; teeth in jaw, vomer and palatines; one, sometimes two, recurved sharp teeth on each side of the upper jaw; gillrakers rather long, 20 on the lower limb; interopercle with a prominent knob which fits into a deep notch of the preopercle; preopercle, both above and below the notch well toothed; dorsal fin continuous, not deeply notched, the third, fourth and fifth spines of equal length, 2.90 in head; the second anal spine 2.75 in head; ventrals 3, caudal deeply emarginate, the middle ray 2.75 in head, the longest ray 1.75.

Color in life, pinkish white, a deeper pink on top of head and about the mouth. Pectorals pink, with deep red in axis; anal pink, with a narrow margin of white and a deep red intermarginal line; ventrals pink, the first ray with a white margin; caudal yellowish with indistinct dusky centre; iris yellow.

Color in spirits, dorsal, caudal, anal, and ventral with intermarginal dusky areas; a dusky spot in axis.

Three specimens, Nos. 1384, 1390 (Fig. 13) and 1460 B. M., from Tahiti, Society Ids.

Lutianus marginatus (Bloch).

Five specimens, Nos. 952, 953, 1026, 1850* and 841* B. M., from Fatè, New Hebrides.

Three specimens, Nos. 1184, 1185 and 1186* B. M., from Shortland Id., Solomons.

Two specimens, Nos. 1491 and 1492 B. M., from Tahiti.

Color in life, silvery, with a wash of pinkish; dorsal pinkish, tipped with deeper red; caudal deep red, with a white tip; pectorals, ventrals and anal bright yellow.

Lutianus gibbus (Bloch).

Depth 2.60; head 2.75, including flap; eye 5.30; D. x, 15; A. III, 9; scales 11-70-17; interorbital 4.25 in head, 1.75 in snout.

Body compressed, scales ctenoid and of moderate size; a row of modified enlarged scales over nape; depth of caudal peduncle equal to width of opercle. Head compresssed, the upper profile concave; snout slightly elongate; maxillary scarcely reaching to orbit, all but its tip is hidden under the preorbital; premaxillary 2.75 in head; mandibles equal to length of snout, 2.30 in head; large curved canine teeth in each jaw; villiform teeth on vomer and palatine, and on jaws inside the canine teeth; gill-rakers rather elongate, 22 on the lower limb; vertical limb of preopercle with a deep notch; above the notch are a few small serrations, below the notch at angle the serrations are coarse; interopercular knob large; posterior margin of opercle ending in a sharp point. Fins: twelfth ray of soft dorsal the longest, but scarcely equal to sixth ray of anal; third anal spine the longest, 2 in length of pectorals, the sixth ray 2.75 in head; base of anal equal to its longest ray; pectorals 1.75 in base of dorsal, 1.75 in head, their tip reaching to a line between vent and origin of anal fin; ventrals 1.75 in head; caudal rather deeply emarginate, the upper lobe the longest, the middle ray is one-half length of longest lower ray.

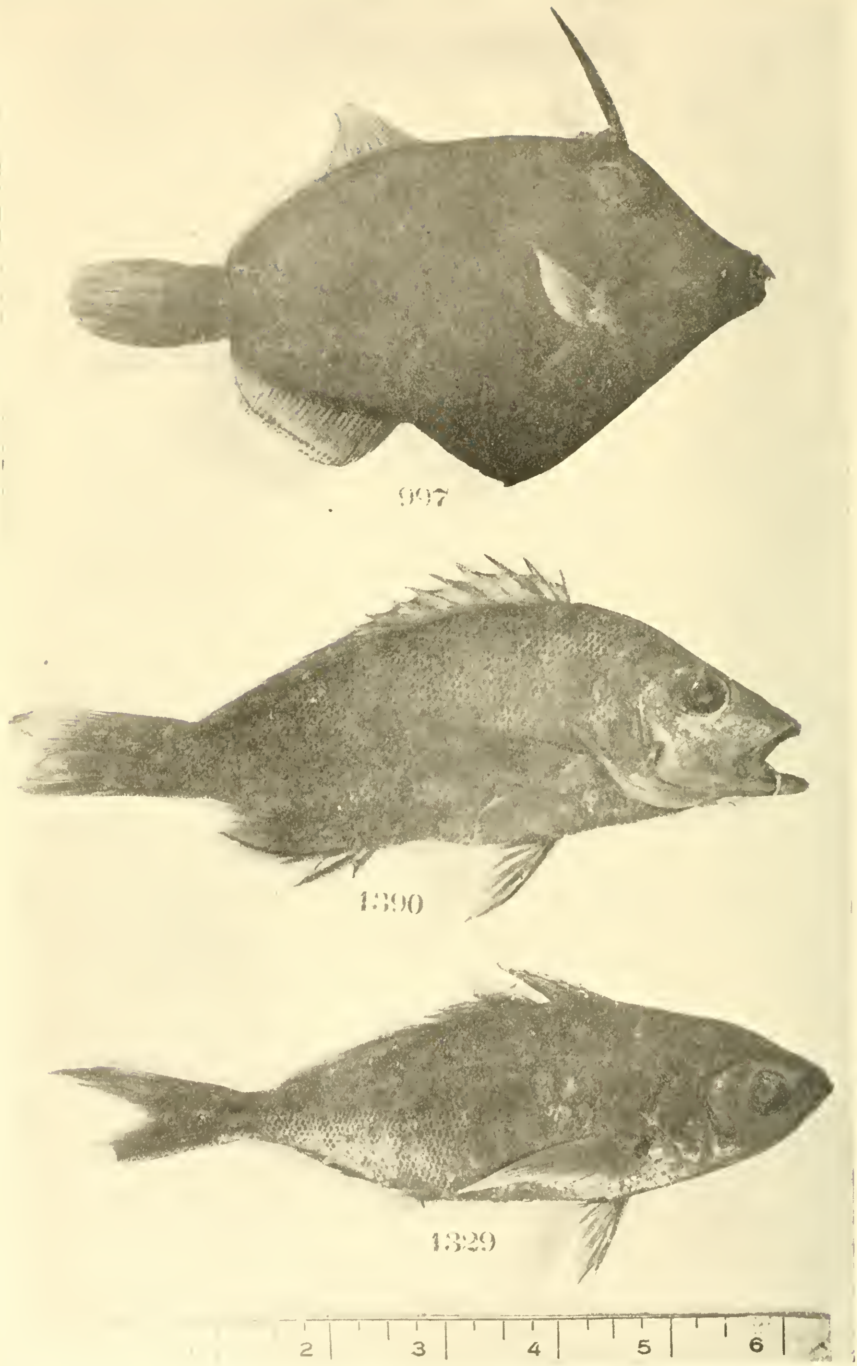

997
1390
1329
2
3
4
5
6

FIG. 13.—997. Monacanthus fatensis Seale. 1390. Lutianus tahitiensis Seale. 1329. Cæsio teres Seale.

Color pinkish; dorsal, anal and caudal dusky, with a narrow marginal line of white; pectorals and ventrals yellow white with dusky tip.

Color in life, crimson, the middle of the scale with a vertical silvery line; head, belly and thorax deep red, with a wash of orange which extends over upper jaw, and from notch of preopercle to axis of pectorals; dorsal red, the lower half of first six webs with a wash of white near base; soft dorsal tipped with white, the webs more or less washed with dusky; caudal maroon red with a narrow margin of white; pectoral and ventral red, the webs of pectoral showing a slight wash of dusky; iris red, with orange blotch on upper part.

One specimen, No. 1344 B. M., from Tahiti. Length 15.50 in.

One specimen, No. 1215 B. M., from Shortland Id., Solomons.

Three specimens, Nos. 1024, 1025 and 1049 B. M., from Fatè, New Hebrides.

Lutianus bohar (Forskal).

One specimen, No. 1113 B. M., from Shortland, Solomons.

Interoperculum with distinct knob; preoperculum slightly notched.

Color is brownish with red wash; axis of pectoral, spinous dorsal anterior margin of soft dorsal; outer rays of caudal and anterior rays of anal blackish; numerous indistinct longitudinal streaks on body.

Lutianus russellii (Bleeker).

Three specimens, Nos. 1171, 1172 and 1173 B. M., from Shortland Id., Solomons.

Color in life is light grayish above, with 4-5 yellow lines along the body; dorsal, anal, caudal and base of pectorals with a slight wash of yellowish.

Lutianus fulviflamma Forskal.

Three specimens, Nos. 1188, 1189 and 1242 B. M., from Shortland Id., Solomons.

Lutianus semicinctus Quoy & Gaimard.

One specimen, No. 1170 B. M., from Shortland Id., Solomons.

Color in life, the upper half of body is pale yellowish, with six dark half bands; the lower half is pinkish; a dusk blotch on sides of caudal peduncle; fins all with yellowish wash.

Lutianus fuscescens (Cuvier & Valenciennes).

One specimen, No. 1523 B. M., from Tahiti, Society Ids.

Lutianus melanesiæ Seale, new species.

Depth 3; head, including flap, 2.80; eye 4; scales 57; D. x, 14; A. III, 8.

Body oblong, compressed; the upper profile is an evenly rounded curve; teeth villiform in jaws with an outer row of small canines; villiform teeth on vomer and palatines; premaxillary reaching to below the middle of eye; preopercle serrated and with a distinct but not deep notch; opercle with a single flat spine; pectorals 1.15 in head; ventrals 1.60 in head; caudal emarginate.

Color in life is a dull silvery white, with about 12 pale yellowish longitudinal lines on sides; a distinct black blotch, larger than eye, on the lateral line under the anterior base of the soft dorsal fin; caudal fin, caudal peduncle, and soft dorsal a bright orange; pectoral, anal and ventral whitish, with a slight wash of orange; snout and top of head pinkish; a dull, dusky blotch on opercles; a wash of yellow on lower part of preopercles.

This species is near *Lutianus melanospilus*, but has a shorter head and the markings are quite different.

One specimen, No. 1187 (Fig. 5) B. M., from Shortland Id., Solomons. Length 7.50 in.

Lutianus bengalensis Bloch.

Two specimens, Nos. 957* and 1080* B. M., from Fatè, New Hebrides.

Seven specimens, Nos. 2149-2155* B. M., from Nukuhiva, Marquesas Ids.

Two specimens, Nos. 1430 and 1433 B. M., from Tahiti.

Cæsio cærulaureus (Lacépède).

Two specimens, Nos. 1111 and 1300 B. M., from Shortland Id., Solomons.

Cæsio teres Seale, new species.

Depth 3.20; head 3.20; eye 4.10; interorbital 3.50; D. x, 15; A. III, 11.

Body cylindrical, slightly compressed, scaled; villiform teeth in jaws, none on palate or tongue; preoperculum entire; mouth moderate, somewhat protractile, the maxillary reaching to below the anterior line of eye; dorsal continuous, the spines feeble; caudal deeply forked; base of anal 1.50 in head; pectorals longer than head.

Color in life, upper two-thirds of the body deep blue; lower third yellowish white; caudal bright yellow without dusky tip; pectorals yellow, the upper base with a deep blue spot; ventrals and anal yellowish; dorsal yellow with the upper half bluish, becoming deep blue at tip; a wash of orange on the sides of head; no bands of color on sides.

One specimen, No. 1329 (Fig. 13) B. M., from Shortland Id., Solomons. This species is near *C. lunaris*, but it is a more cylindrical fish, with different markings.

Cæsio lunaris (Cuvier & Valenciennes.)

Three specimens, Nos. 1109, 1141 and 1330 B. M., from Shortland Id., Solomons.

FAMILY HÆMULIDÆ.

Terapon jarbua (Forskal).

Four specimens, Nos. 1332*, 1262, 1263 and 1321 B. M., from Shortland Id., Solomons.

Scolopsis temporalis Cuvier & Valenciennes.

One specimen, No. 1289 B. M., from Shortland Id., Solomons.

Color in life is silvery white, with 3-4 blotches of brighter silvery color on each side; a conspicuous bright blue band from front of eye, over snout to the other eye; this blue line is bordered above with a line of bright yellow; a bright yellow spot with a wide blue margin just above and behind the eye; a blue line runs from lower part of eye to maxillary; caudal yellow above, pink below; pectoral and ventral white.

Scolopsis monogramma Cuvier & Valenciennes.

Two specimens, Nos. 922* and 925 B. M., from Fatè, New Hebrides.

Scolopsis trilineata Kner.

Three specimens, Nos. 949, 950* and 1005 B. M., from Fatè, New Hebrides.

Scolopsis trilineata Quoy & Gaimard.

Four specimens, Nos. 859, 981, 847 and 1078 B. M., from Fatè, New Hebrides.

Scolopsis bilineata Cuvier & Valenciennes.

One specimen, No. 1114 B. M., from Shortland Id., Solomons.

Gnathodentex aurolineatus (Lacépède).

Depth 3; head, with flap, 3.20; eye 3; interorbital 3; D. x, 9; A. III, 9; snout 2.50.

Body oblong, compressed, scaled; head compressed, conical, the opercles and preopercles with 4-7 rows of scales; maxillary reaching to below the anterior nostril, its upper two-thirds with a prominent serrate ridge; villiform teeth in jaws, with some small canines, the two outer canines of lower jaw the largest; preopercle entire; opercle without spines; dorsal spines not strong, the fifth the longest, but considerably less than the longest ray which is 2 in head; base of anal 2.75 in base of dorsal; third anal spine the longest, 2.50 in head; pectoral 1.10 in head; ventral 1.20; caudal well forked.

Color in life, silvery; 5 broad yellow longitudinal lines below the lateral line, and 5 narrow yellow lines above it; a bright silvery mark in posterior axis of dorsal fin; base of pectoral and the axis dusky; naked part of head brown; dorsal pinkish white, the margin brighter red; anal, caudal and pectorals pinkish; ventrals white.

One specimen from Tubuai Id., No. 735 B. M., length 8.50 in. Five specimens from Mangareva Id.: No. 825 B. M., length 5.75 in.; No. 826 B. M., length 5.50 in.; No. 827 B. M., length 5.75 in.; No. 805 B. M., length 5.50 in.; No. 813 B. M., length 6 in.

Pentapus vittatus Cuvier & Valenciennes.

Four specimens, Nos. 1110, 1161, 1165, 1175 B. M., from Shortland Id., Solomons.

Color in life, pale grayish, with a white line on each side of dorsal; a white line below the lateral line; a blue line over forehead in front of eyes; fins white.

FAMILY SPARIDÆ.

Monotaxis grandoculis (Forskal).

Depth 2.30; head 3; eye 3; D. x, 10; A. iii, 9; scales 6-50-14; interorbital 3.10; snout 2.10.

Body oblong compressed, scaled; depth of caudal peduncle 1.50 in its length; head compressed, rather blunt, very convex above the anterior margin of eyes; snout straight, its angle about 45; mouth protractile; maxillary hidden; mandible 2.10 in head. Teeth: small conical canines in anterior of jaws, a single row of molars in sides of jaws; gill-rakers short and blunt, 7 on lower limb; opercles scaled, without spines or serrations; preopercle scaled and with fine serrations on the posterior part. The dorsal is received into a groove; the attachment of the membrane alternates from right to left side of spines: the fifth spine 2.10 in head, 3 in base of fin; the 6-7 dorsal rays the longest, 1.80 in head; base of anal 2.20 in base of dorsal, its longest ray 2.15 in head; the third anal spine is the longest, 2.30 in head; pectorals reaching to above anal fin, their length 1.40 in head; base of dorsal equal to head; caudal deeply emarginate, the middle ray 2.75 in outer ray.

Color, silvery, with three white bands over the back, the first on the nuchal region down the opercles and preopercles; the second below the basis of the 1-4 dorsal spines and sloping obliquely back; the third between the ninth spine and first ray, extending vertically down towards origin of anal; a black spot in axis of pectorals; a black splotch on upper part of eye; the modified scales on the nuchal region tinted with dusky; dorsal pinkish white, with a dusky margin and a dusky blotch on webs, and at base of anterior 5 rays of dorsal; the posterior portion of the soft dorsal and anal pinkish white; ventrals pinkish, with dusky tip; pectorals and caudal pinkish white without markings.

One specimen from Tubuai, No. 752 B. M., length 8.75 in.

One specimen, No. 1380 B. M., from Tahiti, Society Ids.

Three specimens, Nos. 1125, 1126 and 1288 B. M., from Shortland Id., Solomons.

Lethrinus mahsena (Forskal).

Two specimens, Nos. 675* and 843* B. M., from Mangareva.

Lethrinus harak (Forskal).

One specimen, No. 951 B. M., from Fatè, New Hebrides.

One specimen, No. 1271 B. M., from Shortland Id., Solomons.

Color in life, whitish, with a big black blotch on lateral line below the seventh dorsal spine to third dorsal ray; above each blotch is an area of yellow; a short bright blue line from eye to lower opening of nostril; eyes yellow; inside of mouth red; fins pinkish.

Lethrinus moensii Bleeker.

One specimen, No. 2160 B. M., from Nukuhiva, Marquesas Ids.

Lethrinus leutjanus (Bloch).

One specimen, No. 1067 B. M., from Fatè, New Hebrides.

FAMILY KYPHOSIDÆ.

Kyphosus cinerascens (Forskal).

One specimen, No. 1043 B. M., from Fatè, New Hebrides.

Four specimens, Nos. 1112, 1318, 1316* and 1320 B. M., from Shortland Id., Solomons.

Color in life is dusky silvery, sides with long yellowish lines almost as wide as interspaces, these lines most distinct on the middle of the body, and becoming indistinct on the lower part; a yellow line from gape to opercles, another line through the eye; spinous dorsal bluish; soft dorsal slightly darker; pectorals bluish, with wash of yellow near base.

FAMILY MULLIDÆ.

Mulloides samoensis Günther.

Nine specimens, Nos. 872, 873, 930, 960, 962, 1018, 852* B. M., and five young, from Fatè, New Hebrides.

In spirits the dark spot on the lateral line under the 6-7 dorsal spine shows more distinctly than in life, while the single lateral stripe seen in larger specimens disappears.

Eleven specimens, Nos. 2136-2140, 2141*, 2142*, 2143*, 2144*, 2145*, 2146* B. M., from Nukuhiva, Marquesas.

One specimen, No. 1477 B. M., Tahiti.

Mulloides ruber Klunzinger.

Depth 3.55; head 3.10; eye 3.20; D. VII, 9; A. 7; scales 3-42-7; interorbital 3 in head.

Body elongate, compressed; the under profile of the head almost straight, the upper is very convex; snout 2.20 in head; lips moderately thick; length of mandible 2.90 in head; the barbules very fleshy, granulate, scarcely reaching to below angle of preopercle, their length 1.50 in head; teeth minute, in several rows in each jaw; no teeth on vomer or palatine; opercle with a minute flat spine. Fins: base of spinous dorsal slightly greater than base of soft dorsal; first dorsal spine the longest, 1.30 in head, less than depth of body by half the width of eye; base of anal 3 in head, its longest ray 2.10; pectorals and ventrals of equal length, 1.15 in head; caudal forked, the lobes equal.

Color in life, red above, pinkish below; a yellow line from posterior part of eye to base of caudal; fins a pale orange, the pectorals pinkish; iris yellow; barbules white.

Color in spirits, uniform yellowish white; fins a little lighter.

One specimen, No. 1402* B. M., from Tahiti. Length 9.50 in.

Mulloides auriflamma (Forskal).

Six specimens, Nos. 2143*, 2144*, 2145*, 2146*, 2147, 2148 B. M., from Nukuhiva, Marquesas Ids.

One specimen, No. 1478 B. M., from Tahiti.

One specimen, No. 767 B. M., from Tubuai.

Mulloides flammeus Jordan & Evermann.

One specimen, No. 1595 B. M., from Raiatea, Society Ids.

One specimen, No. 1479 B. M., from Tahiti.

Pseudupeneus moana Jordan & Seale.
(*Upeneus trifasciatus* Günther, not Cuv. & Val.)

Seven specimens, Nos. 718, 719, 720, 721, 1435-1437 B. M., from Tahiti.

One specimen, No. 727 B. M., from Tubuai, Austral Ids.

Three specimens, Nos. 811, 834*, 841* B. M., from Mangareva.

Three specimens, Nos. 1963-1965 B. M., from Rarotonga, Cook Ids.

One specimen, No. 1069 B. M., from Fatè, New Hebrides.

Three specimens, Nos. 2133-2135 B. M., from Nukuhiva, Marquesas Ids.

Pseudupeneus aurantiacus Seale, new species.

Depth 4; head 3.30; eye 6.75; D. VIII, 9; A. 7; scales 3-30-6· interorbital 4.20; snout 1.75.

Body oblong, compressed, scaled; lateral line complete; caudal peduncle rather long, its depth 2 in its length. Head compressed, rather elongate; barbules reaching to below the posterior margin of preopercle, their length 1.22 in head; opercles and top of head scaled; a small flat spine from the posterior margin of opercle; lips rather thick; maxillary short, scarcely reaching to the posterior third of snout; teeth small, in a single series in each jaw, no teeth on vomer, tongue or palatines; gill-rakers many, of moderate length. Fins: the third dorsal spine is the longest, 3.75 in head, its tip reaching base of soft dorsal; base of soft dorsal 2.20 in head, its longest ray 2.90 in head, its last ray equal in length to its fourth; base of anal equal to base of soft dorsal, its height equal to its length, its last ray equal to its fourth ray; pectorals 1.50 in head; ventrals longer, 1.30 in head, slightly shorter than the barbules; caudal well forked, the lobes equal, and equal in length to ventrals.

Color in life, a uniform bright orange yellow, no saddle of color on the caudal peduncle; three short blue lines through the eye, and one very short one just below the orbit; fins and barbules orange.

Color in formalin, a uniform yellowish white, with a slight wash of orange, the blue lines through eye scarcely showing; fins yellowish, the caudal, pectorals and ventrals with a wash of pinkish.

One specimen, No. 758 (Fig. 14) B. M., from Tubuai, Austral Ids. Length 10 in.

Pseudupeneus barberinus (Lacépède).

Depth 3.75; head 3 in length; eye 7; D. VIII, 9; A. 7; scales 3-31-7; interorbital 4.20 in head, 2.75 in snout.

Body compressed, elongate, scaled; snout convex; lips thick; mandibles 2.75 in head; premaxillary fan-shaped, its distal end equal in width to eye; a single row of fine teeth in each jaw; barbules reaching to below pupils, their length 1.55 in head; opercle with a small spine. Fins: base of soft dorsal equal to base of spinous dorsal; the third dorsal spine is the longest, being about equal in length to depth of fish; base of anal 2.75 in head; pectorals 1.75 in head; ventrals 1.50 in head; caudal forked, the lobes equal.

Color in life, white, with a blue tint on back; a dusky spot on caudal peduncle; a dusky line from eye to below posterior margin of dorsal; three yellow lines from top of head, through eye to half way down the snout, the interspaces between the lines bluish; dorsal white, the soft dorsal with yellowish lines; pectorals pinkish white; anal pinkish white, with three oblique yellow lines; caudal and its base pinkish; iris yellow; barbules white.

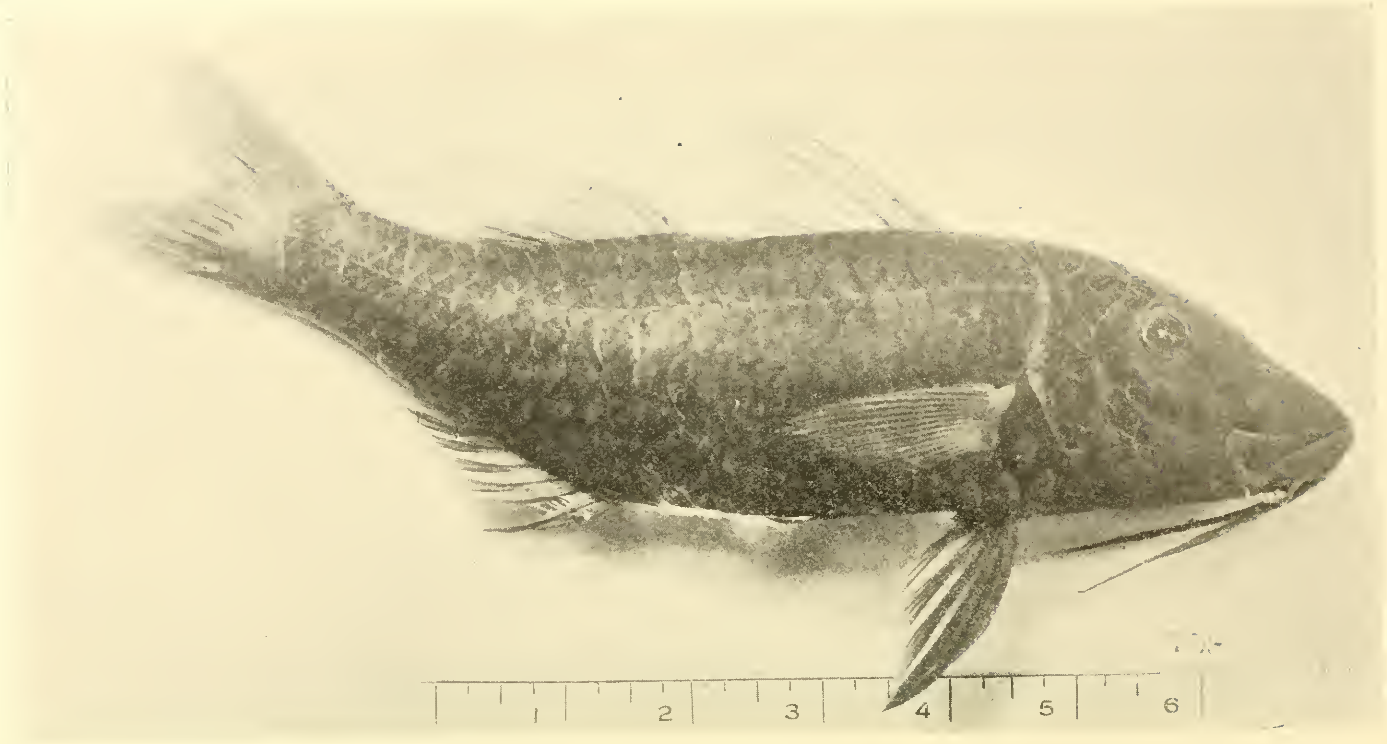


FIG. 14.—758. Pseudupeneus aurantiacus Seale.

Color in spirits, yellowish white, slightly darker above; a dusky spot on each side of caudal peduncle, a dusky line from eye along sides, uniting above the round spot on caudal peduncle; anterior third of spinous dorsal with a slight wash of dusky; other fins yellowish white.

Two specimens from Tahiti: No. 1410 B. M., length 12 in.; No. 1411 B. M., length 13 in.

Two specimens, Nos, 921 and 923 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 1227* and 1315 B. M., from Shortland Id., Solomons.

Pseudupeneus chryserydros (Lacépède).

One specimen, No. 1036 B. M., from Fatè, New Hebrides.

In life there is a pinkish flush on lower half of fish; five or six bright blue lines on side of head, and a yellow saddle over caudal peduncle.

Pseudupeneus bifasciatus (Lacépède).

One specimen, No. 1966 B. M., from Rarotonga, Cook Ids.

One specimen, No. 852* B. M., from Fatè, New Hebrides.

Pseudupeneus pleurospilos (Bleeker).

Two specimens, Nos. 1211 and 1240 B. M., from Shortland Id., Solomons.

Pseudupeneus porphyreus Jenkins.

One specimen, No. 1594 B. M., from Raiatea, Society Ids.

Upeneus vittatus Cuvier & Valenciennes.

One specimen, No. 1536 B. M., from Tahiti.

Two specimens, Nos. 2141*, 2142* B. M., from Nukuhiva, Marquesas Ids.

FAMILY GERRIDÆ.

Xystæma argyreum (Forster).

Six specimens, Nos. 863, 864, 868, 869, 929 and 932 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 1176 and 1268 B. M., from Shortland Id., Solomons.

FAMILY CIRRHITIDÆ.

Paracirrhites forsteri (Bloch).

Five specimens, Nos. 2155*-2159 B. M., from Nukuhiva, Marquesas Ids.

FAMILY POMACENTRIDÆ.

Pomacentrus pavo (Bloch).

Four specimens, Nos. 1174, 1208*, 1210 and 1219 B. M., from Shortland Id., Solomons.

Seven specimens, Nos. 1654, 1640-1645 B. M., from Raiatea, Society Ids.

Pomacentrus lividus (Forster).
(*Pomacentrus cyanospilus* Cuvier & Valenciennes.)

Eleven specimens, Nos. 1655-1657, 1646-1653 B. M., from Raiatea, Society Ids.

Seven specimens, Nos. 2206-2212 B. M., from Nukuhiva, Marquesas Ids.

Pomacentrus nigricans Lacépède.
(*Pomacentrus scolopsus* Quoy & Gaimard.)

Four specimens, Nos. 897-899 and 1030 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 2247-2248 B. M., from Marquesas.

Two specimens, Nos. 1179 and 1299* B. M., from Shortland Id., Solomons.

Two specimens, Nos. 1658-1659 B. M., from Raiatea, Society Ids.

Two specimens, Nos. 2479*-2476* B. M., from Makatea, Paumotu Ids.

Pomacentrus notophthalmus (Bleeker).

One specimen, No. 991* B. M., from Fatè, New Hebrides.

Pomacentrus tæniurus Bleeker.

Three specimens, Nos. 1520-1522 B. M., from Tahiti.

One specimen, No. 944 B. M., from Fatè, New Hebrides.

Pomacentrus tripunctatus Cuvier & Valenciennes.

Two specimens, Nos. 890* and 896* B. M., from Fatè, New Hebrides.

Abudefduf cœlestinus (Cuvier & Valenciennes).

Five specimens, Nos. 1014*, 1021, 1022, 1060 and 1081* B. M., from Fatè, New Hebrides.

Six specimens, Nos. 1140, 1146*, 1147, 1177, 1178 and 1332 B. M., from Shortland Id., Solomons.

One specimen, No. 1636 B. M., from Raiatea, Society Ids.

Ten specimens, Nos. 2237-2246 B.M., from Nukuhiva, Marquesas Ids.

One specimen, No. 1517* B. M., from Tahiti.

Abudefduf multifasciatus (Cuvier & Valenciennes).

One specimen, No. 1637 B. M., from Raiatea, Society Ids.

Abudefduf septemfasciatus (Bloch).

Two specimens, Nos. 909, 910 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 1145* and 1146* B. M., from Shortland Id., Solomons.

One specimen, No. 1985 B. M., from Rarotonga, Cook Ids.

Three specimens, Nos. 2474*, 2475*, 2476* B. M., from Makatea, Paumotu Ids.

One specimen, No. 1639 B. M., from Raiatea, Society Ids.

Abudefduf sordidus (Forskal).

Two specimens, Nos. 936* and 968 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 2477* and 2478* B. M., from Makatea, Paumotu Ids.

Abudefduf curaçao (Bloch).

Two specimens, Nos. 1194 and 1303 B. M., from Shortland Id., Solomons.

Abudefduf jordani[5] Seale, new species.

Depth 1.85; head 3.90; eye 3.25; snout 3; D. XVII, 16; A. II, 16; lateral line 26.

Body compressed, scaled; a single series of flat teeth in each jaw; margins of the preopercle smooth; the greatest depth of the interorbital equal to one-half the eye; caudal deeply forked, the lobes equal; dorsal and anal sharp-pointed.

Color in spirits: thorax, belly and sides of the head yellowish brown, growing into deep black on the posterior half of the body; dorsal, caudal and anal black; pectorals yellowish, ventrals yellowish, with dusky wash on outer rays.

Seven specimens, Nos. 1115-1119, 1162 (Fig. 2) and 1302 B. M., from Shortland Id., Solomons. No. 1162 is the type of species.

Abudefduf behnii (Bleeker).

One specimen, No. 1986 B. M., from Rarotonga, Cook Ids.

Abudefduf cæsio Seale, new species.

Depth 2.50; head 3.30; eye 2.75; interorbital 3.50; D. XIII, 13; A. II, 12.

Body compressed, rather short, scaled, the lateral line terminating under the soft dorsal, depth of caudal peduncle equal to its length; head compressed, equally rounded; mouth small; a single row of small teeth in each jaw; snout without scales, its length less than diameter of the eye; preopercle or inferior orbital not

[5] Named for President David Starr Jordan of the Leland Stanford Junior University.

denticulate, the posterior limb of the preopercle slanting obliquely forward so the angle is under the posterior third of eye; base of dorsal fin 1.75 in length of fish without caudal; the soft rays of dorsal and anal are of about equal length and longer than the spines; pectorals and ventrals are of about equal length, .2 in base of dorsal; caudal truncate.

Color in life, uniform blue, no black spot in axis or at base of fins. In spirits the color fades to a dull bluish; the dorsal is dusky, the webs between the first six spines white; anal and caudal dusky; pectorals and ventrals yellowish.

One specimen, No. 742* (Fig. 8) B. M., from Tubuai, Austral Ids. Length 2 in.

Abudefduf saxatilis (Linnæus).

One specimen, No. 613* B. M., from Tubuai, Austral Ids.

One specimen, No. 1139* B. M., from Shortland Id., Solomons.

Abudefduf taupo Jordan & Seale MS.

One specimen, No. 895 B. M., from Fatè, New Hebrides.

The species will be described in the forthcoming report on the fishes of Samoa.

Abudefduf uniocellatus (Quoy & Gaimard).

Four specimens, Nos. 843*, 900, 1039 and 1040 B. M., from Fatè, New Hebrides.

Color in life, a deep violet blue, no spots on the scales; belly, thorax and chin a bright yellow; dorsal fin violet, with a submarginal band of yellow which broadens posteriorly until it occupies the upper half of the soft dorsal; anal yellow, except a violet blotch on the inner posterior part of the fin; caudal with the basal half violet, and the posterior half yellow; pectorals yellow, their base and axis violet; ventrals yellow, the elongate filament of the outer ray blue.

Abudefduf leucopomus (Cuvier & Valenciennes).

Color, bluish, a black spot in the posterior axis of the dorsal, and another distinct larger black spot on the upper part of caudal.

Two specimens, Nos. 2222 and 2223 B. M., from Nukuhiva, Marquesas Ids.

Three specimens, Nos. 708*, 790 and 791 B. M., from Tubuai, Austral Ids.

Two specimens, Nos. 1993 and 1997 B. M., from Rarotonga, Cook Ids.

Abudefduf amabilis (De Vis).

Eight specimens, Nos. 901-906, 1038 and 1011* B. M., from Fatè, New Hebrides.

Abudefduf zonatus (Cuvier & Valenciennes).

Nine specimens, Nos. 2226-2234 B. M., from Nukuhiva, Marquesas Ids.

Chromis cæruleus (Cuvier & Valenciennes).

Three specimens, Nos. 1120, 1121 and 1304 B. M., from Shortland Id., Solomons.

Chromis axillaris (Bennett).

Three specimens, Nos. 1682-1684 B. M., from Raiatea, Society Ids.

Acanthochromis polyacanthus (Bleeker).

One specimen, No. 907 B. M., from Fatè, New Hebrides.

Dascyllus aruanus (Linnæus).

Two specimens, Nos. 908, and 1015 B. M., from Fatè, New Hebrides.

Three specimens, Nos. 2172-2174 B. M., from Nukuhiva, Marquesas Ids.

One specimen, No. 1305 B. M., Shortland Id., Solomons.

Ten specimens, Nos. 1626-1635 B. M., from Raiatea, Society Ids.

Dascyllus melanurus (Bleeker).

Two specimens, Nos. 1122-1123 B. M., from Shortland Id., Solomons.

FAMILY LABRIDÆ.

Chœrops macrodon (Bleeker).

One specimen, No. 956 B. M. from Fatè, New Hebrides.

One specimen, No. 1309* B. M., from Shortland Id., Solomons.

Lepidaplois axillaris (Bennett).

One specimen, No. 1926 B. M., from Rarotonga. Cook Ids.

Epibulus insidiator (Bloch).

One specimen, No. 1484 B. M., from Tahiti.

One specimen, No. 1624 B. M., from Raiatea, Society Ids.

One specimen, No. 971 B. M., from Fatè, New Hebrides.

Hemigymnus melapterus (Bloch).

Two specimens, Nos. 1182 and 1183 B. M., from Shortland Id., Solomons.

Anampses cæruleopunctatus Rüppell.

One specimen, No. 726 B. M.., from Tubuai, Austral Ids.

One specimen, No. 1228* B. M., from Rarotonga, Cook Ids.

Stethojulis casturi Günther.

One specimen, No. 1929 B. M., from Rarotonga, Cook Ids.

Halichœres centiquadrus (Lacépède).

One specimen, No. 1254 B. M., from Shortland Id., Solomons.

One specimen, No. 1622 B. M., from Raiatea, Society Ids.

Nine specimens, Nos. 685*, 698*, 699*, 700*, 714, 715, 722, 723 and 1482* B. M., from Tahiti.

Halichœres trimaculatus (Quoy & Gaimard).

One specimen, No. 1516 B. M., from Tahiti.

One specimen, No. 768 B. M., from Tubuai, Austral Ids.

One specimen, No. 1625 B. M., from Raiatea, Society Ids.

Three specimens, Nos. 1250, 1251, 1252* B. M., from Shortland Id., Solomons.

Two specimens, Nos. 1001 and 1002 B. M., from Fatè, New Hebrides.

Halichœres notophthalmus (Bleeker).

One specimen, No. 1932 B. M., from Rarotonga, Cook Ids.

Halichœres scapularis (Bennett).

Three specimens, Nos. 1101, 1272* and 1319 B. M., from Shortland Id., Solomons.

General color, bluish and green; the posterior two-thirds of the body is a bright olive green; anterior of this the body is bluish, fading into white on lower half of sides and belly; an irregular line extending back from the eye to the caudal; a yellowish blotch on opercles; dorsal with pale pink and green wavy longitudinal lines; caudal tipped with green and having pink and bluish lines anteriorly; pectorals and ventrals white.

Halichœres solorensis Bleeker.

Three specimens, Nos. 2261-2263 B. M., from Nukuhiva, Marquesas Ids.

Halichœres modestus (Bleeker).

One specimen, No. 1041 B. M., from Fatè, New Hebrides.

Macropharyngodon meleagris (Bleeker).

One specimen, No. 1228* B. M., from Shortland Id., Solomons.

Platyglossus marginatus (Rüppell).

One specimen, No. 1623 B. M., from Raiatea, Society Ids.

Coris aygula Lacépède.

One specimen, No. 959 B. M., from Fatè, New Hebrides.

One specimen, No. 739 B. M., from Tubuai, Austral Id.

Three specimens, Nos. 705*, 706* and 707* B. M., from Tahiti.

Coris caudimaculatus (Quoy & Gaimard).

One specimen, No. 1930 B. M., from Rarotonga, Cook Ids.

Julis pulcherrima (Günther).

Seven specimens, Nos. 708*-713 and 1485* B. M., from Tahiti.

Hologymnosus semidiscus (Lacépède).
(*Coris annulatus* Lacépède.)

One specimen, No. 1924 B. M., from Rarotonga, Cook Id.
Two specimens, Nos. 1482* and 1485* B. M., from Tahiti.

Thalassoma fuscum (Lacépède).

One specimen, No. 731 B. M., from Tubuai, Austral Ids.
Seven specimens, Nos. 1933-1938, 1943 B. M., from Rarotonga, Cook Ids.
One specimen, No. 2491* B. M., from Makatea, Paumotu Ids.

Thalassoma dorsale (Quoy & Gaimard).

Eight specimens, Nos. 1102- 1106, and 1148-1150 B. M., from Shortland Id., Solomons.

Thalassoma schwanefeldii (Bleeker).

One specimen, No. 1368 B. M., from Tubuai, Austral Ids.

Thalassoma lunare (Linnæus).

Two specimens, Nos. 1102 and 1203 B. M., from Shortland Id., Solomons.

Thalassoma punctatum Seale.

Two specimens, Nos. 1939-1940 B. M., from Rarotonga, Cook Ids.

Thalassoma duperreyi (Quoy & Gaimard).

One specimen, No. 800 B. M., from Mangareva Id.

Thalassoma umbrostigma (Rüppell).

Four specimens, Nos. 2492*, 2493*, 2494*, 2495* B. M., from Makatea, Paumotu Ids.

Thalassoma aneitense (Günther).

Three specimens, Nos. 830, 845* and 810 B. M., from Nukuhiva, Marquesas Ids.

Cheilio inermis (Forskal).

Depth 5; head 3; eye 11.5 in head; D. x, 13; A. III, 12; scales 5-45-10; interorbital 4.85 in head.

Body elongate, slightly compressed; head conical; lips of moderate thickness; mandible 2.5 in head; a single row of short, rather blunt teeth in each jaw, the two anterior ones of the upper jaw slightly enlarged; gill-rakers short; opercle and preopercle unscaled, a few scales on the cheeks below the eye; dorsal fin continuous, its origin above the origin of ventral, the spines rather flexible; base of anal 2.75 in length of fish, 1.50 in base of dorsal; ventrals short, 2 in snout; pectorals 3 in head; caudal rounded.

Color in spirits: a dull gray, with slight wash of green; fins a little lighter; anal fin with mottlings of lighter lines; a black spot larger than eye on 11-14 scale of lateral line, a larger light spot touching this at the lower anterior margin, and a smaller one above on its upper anterior margin; a small light dot on the eighth scale of lateral line; no lateral band; caudal with wash of yellowish.

One specimen, No. 1427 B. M., from Tahiti, length 16 in.

Gomphosus tricolor (Quoy & Gaimard).

Two specimens. Nos. 809 and 837 B. M., from Mangareva Id., length 87.5 inches.

One specimen, No. 1927 B. M., from Rarotonga, Cook Ids.

Thalliurus chlorourus (Bloch).

Seven specimens, Nos. 801, 815, 824 and 828, 831, 832, 833 B. M., from Mangareva Id.

One specimen, No. 1486 B. M., from Tahiti.

Two specimens, Nos. 977 and 920 B. M., from Fatè, New Hebrides.

Three specimens, Nos. 1144, 1204 and 1281 B. M., from Shortland Id., Solomons.

One specimen, No. 2529 B. M., from Makatea, Paumotu Ids.

General color, greenish, red dots on the cheeks; dorsal fins mottled with darker green and pinkish; the soft dorsal with pink on posterior part; lower third of pectoral yellowish.

Cheilinus fasciatus (Bloch).

One specimen, No. 1027 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 1154 and 1200 B. M., from Shortland Id., Solomons.

Two specimens, Nos. 1944* and 1945* B. M., from Cook Ids.

Color in life: the anterior third of the body is reddish, with a wash of orange, three orange oblique lines extending in front of eye, five light yellowish lines between the pale green of the body; some scattered scales of darker green over the body.

Cheilinus digrammus (Lacépède).

Five specimens, Nos. 1099, 1100, 1166, 1167 and 1255 B. M., from Shortland Id., Solomons.

Color in life, a pale green, with black oblique lines on the opercles; fins with small dots, a dash of yellow on the crescent of caudal fin.

Cheilinus trilobatus (Lacépède).

Two specimens, Nos. 725 and 1369* B. M., from Tubuai, Austral Ids.

Two specimens, Nos. 945* and 941 B. M., from Fatè, New Hebrides.

One specimen, No. 823 B. M., from Mangareva Id.

One specimen, No. 1369 B. M., from Tahiti.

FAMILY SCARICHTHYIDÆ.

Scarichthys auritus (Cuvier & Valenciennes).

Two specimens, Nos. 1917 and 1943* B. M., from Rarotonga, Cook Ids.

Scarichthys cœruleopunctatus (Rüppel).

Two specimens, Nos. 1918 and 1942 B. M., from Rarotonga, Cook Ids.

Scarichthys rarotongæ Seale, new species.

Depth 3.50; eye 3.75 in head, 1 in preorbital portion of head, and 1 in interorbital space; D. x, 10; A. III, 9; scales of lateral line 24.

Body oblong, compressed; the lateral line interrupted, the tubules two-branched; teeth and nostrils generic; the profile of the head seems slightly different from other species of *Scarichthys*, being slightly concave above the posterior margin of the eye, and snout has a slope slightly greater than 45°; caudal peduncle 2.30 in head; the tubules on the orbitals and preopercles are quite prominent; base of anal fin 2.75 in base of dorsal; length of pectorals 1.40 in head; ventrals, 2.

Color in spirits is a dull coppery green without white dots; there are about five zones of darker greenish on the body, the first being above the base of the pectorals and over the shoulders, the second is below the seventh and eighth dorsal spines, the third is below the first and third dorsal rays, the fourth is below the fifth and seventh dorsal rays, and the fifth is below the axis of the dorsal; there is a dark blotch on the base of the pectorals, and another in the posterior axis of the dorsal; this dark spot occupies the base of the last four dorsal rays; the dark zones of color on the body, with the exception of the anterior one, invade the basal half of the dorsal fin; pectorals white, without marks; ventrals with indistinct darker markings; anal with five bands of dusky; caudal greenish, the tip white, and a white cross band near the tip.

One specimen, No. 1903 (Fig. 8) B. M., length 4 in., from Rarotonga, Cook Ids.

Callyodon dubius (Bennett).

One specimen, No. 1375 B. M., from Tahiti.

One specimen, No. 749 B. M., from Tubuai, Austral Ids.
One specimen, No. 1620 B. M., from Raiatea, Society Ids.

Callyodon macrocheilus (Bleeker).

Two specimens, Nos. 991* and 992 B. M., from Fatè, New Hebrides.

Callyodon pentazonus (Bleeker).

One specimen, No. 1233 B. M., from Shortland Id., Solomons.

Callyodon strongylocephalus (Bleeker).

Two specimens, Nos. 1370 and 1527 B. M., from Tahiti.

Callyodon lepidus (Jenyns).

One specimen, No. 1921 B. M., from Rarotonga, Cook Ids.

Callyodon dimidiatus (Bleeker).

Three specimens, Nos. 1205, 1206 and 1229 B. M., from Shortland Id., Solomons.

Callyodon cyanognathus (Bleeker).

Six specimens, Nos. 1097, 1098, 1136, 1137, 1139* and 1243 B. M., from Shortland Ids., Solomons.
One specimen, No. 994 B. M., from Fatè, New Hebrides.

Callyodon lacerta (Cuvier & Valenciennes).

Five specimens, Nos. 1180, 1181, 1235, 1244* 1245 B. M., from Shortland Id., Solomons.

Callyodon celebicus Bleeker.

One specimen, No. 1919 B. M., from Rarotonga, Cook Ids.

Callyodon bataviensis Bleeker.

One specimen, No. 857* B. M., from Fatè, New Hebrides.

Callyodon pyrrhostethus (Richardson).

One specimen, No. 1920 B. M., from Rarotonga, Cook Ids.
One specimen, No. 1045 B. M., from Fatè, New Hebrides.

Callyodon tricolor (Bleeker).

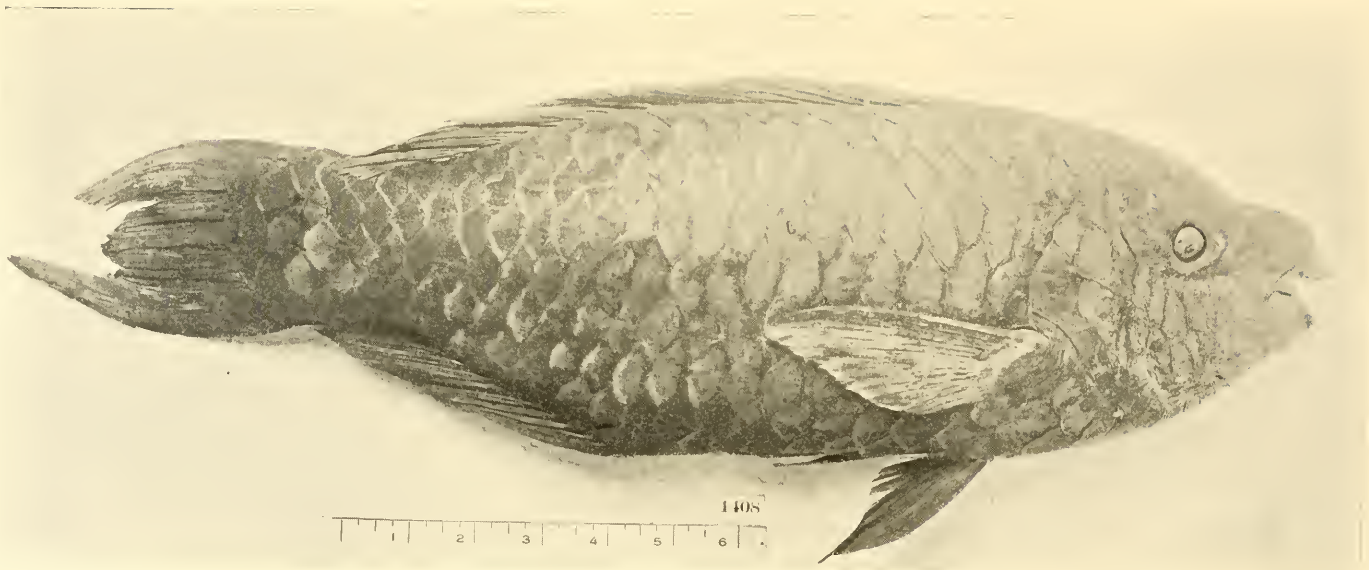
Four specimens, Nos. 1131*, 1132, 1151 and 1152 B. M., from Shortland Id., Solomons.

Callyodon balinensis (Bleeker).

Three specimens, Nos. 1096, 1230 and 1231 B. M., from Shortland Id., Solomons.
One specimen, No. 2376* B. M., from Tahiti.

Callyodon waitei Seale, new species.

Depth 2.80; head 3; eye 9 in head, 4 in interorbital; D. x, 10; A. II, 10; scales 2-24-7; interorbital space 3 in head.


1408
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6

FIG. 15.—1408. Callyodon waitei Seale.

Body oblong, slightly compressed, covered with large striate scales; the lateral line is interrupted, the tubules with two or four branches; depth of the caudal peduncle equal to distance from eye to the posterior margin of the opercle; cheeks with three rows of scales, the first and second row with 6 scales each, the third row with only 3 scales; opercle with 8 large scales; the lower opercular limb with 7 scales; 7 scales in front of dorsal; upper lip double; the lip covering about a third of the dermal plate; upper dermal plate with 2 strong canine teeth on each side at angle of mouth; lower jaw with canine at angle; base of dorsal fin 2 in length of fish, without caudal, its longest ray 2.90 in base; base of anal equal length of pectorals, 1.25 in head; ventrals 1.70 in head; lobes of caudal much produced, the longest ray equal to distance from angle of jaws to posterior margin of opercles, the shortest ray a third shorter.

Color in life, green; chin and margin of lips red; dorsal bluish green with a margin of blue; a wide blue band around mouth; upper third of teeth green, the mid third whitish, the lower third green; teeth in lower jaw entirely greenish blue; inner half of anal fin red, the outer half bluish green; upper and lower margins of caudal deep blue, the mid part of fin green.

Color in spirits, dull green; margin of lips yellowish white, followed posteriorly by a broader green incomplete circle; posterior of this is another narrow white line; a broad greenish area on chin.

One specimen[6], No. 1408 (Fig. 15) B. M., length 19.50 in., from Tahiti.

Callyodon fasciatus Cuvier & Valenciennes.
(*Scarus rivulatus* Cuvier & Valenciennes.)

One specimen, No. 972 B. M., from Fatè, New Hebrides.

Callyodon dussumieri (Cuvier & Valenciennes).

Two specimens, Nos. 993 and 995 B. M., from Fatè, New Hebrides.

Callyodon quoyi (Bleeker).

One specimen, No. 1314 B. M., from Shortland Id., Solomons.

Callyodon erythrodon Cuvier & Valenciennes.
(*Scarus sumbawensis* Bleeker.)

One specimen, No. 1374 B. M., from Tahiti, Society Ids.

Two specimens, Nos. 1923 and 1924 B. M., from Rarotonga, Cook Ids.

Two specimens, Nos. 927 and 979 B. M., from Fatè, New Hebrides.

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[6] I take pleasure in naming this fine large *Scarus* for Edgar R. Waite, Zoologist and Curator of Fishes and Mammals at the Sydney Museum, Australia (now Curator of Christchurch Museum), in recognition of his important works on Pacific fishes.

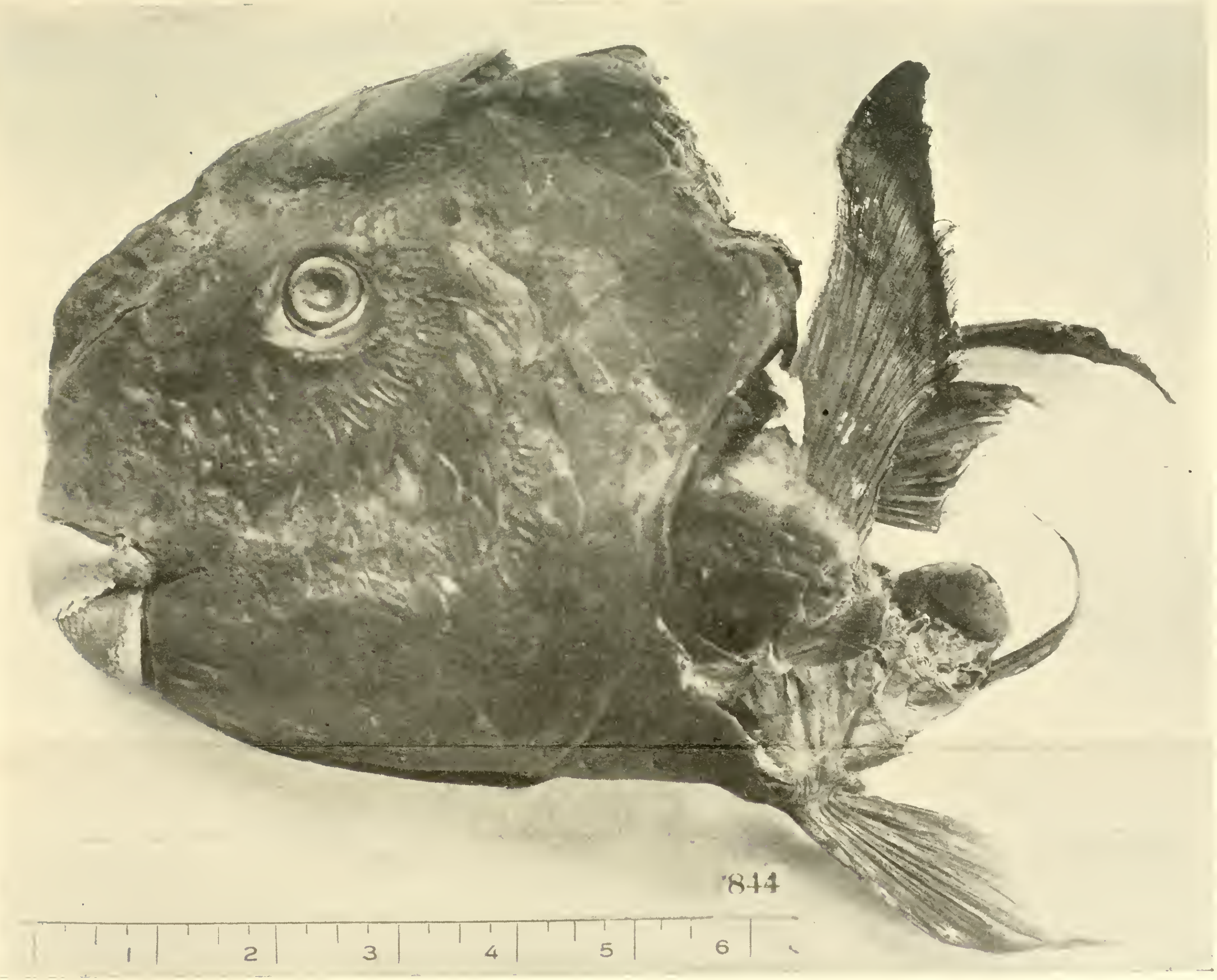

FIG. 16.—844. Callyodon ultramarinus Jordan & Seale.

Callyodon ultramarinus Jordan & Seale, MS.

Head gibbous, its length less than depth; teeth pea green, the upper with a strong pointed tooth at angle; lips thin, single and very narrow, scarcely covering basal third of the teeth; eye small, 8.10 in head; snout from anterior of orbit to tip of teeth, 2 in head; interorbital space very convex, 2.85 in head; snout with a very prominent hump; cheeks with three series of scales, the lower series impinging upon the limb of the preopercle, but covering only its upper third; the lower limb of opercle with a single series of scales, gill-rakers very fine and numerous.

Scales of body large, a series of 4 in front of the ventral fins; the ventrals 1.55 in head, their origin is under the middle of the base of pectorals; pectorals 1.40 in head, their base is equal to the angle of the mouth, 2.75 in the longest ray.

Color: the upper half of head from a line with angle of jaws to lower base of opercular flap, a uniform drab; the lower half and the thorax are a uniform yellowish white, the line of demarcation between the two colors is quite distinct; a narrow yellow line covering lips; pectorals drab, the upper ray the axis and tip of lower rays yellowish.

One specimen (a head,[7] length 6 in.), No. 844 (Fig. 16) B. M., from Mangareva Id.

This species, of which the type is from Apia, Samoa, will be described and figured in the forthcoming report of the collections of Jordan & Kellogg in Samoa.

Callyodon oviceps (Cuvier & Valenciennes).

One specimen, No. 1488 B. M., from Tahiti.

Callyodon moensi (Bleeker).

Three specimens, Nos. 1371-1373 B. M., from Tahiti.

Two specimens, Nos. 983 and 924 B. M., from Fatè, New Hebrides.

FAMILY TOXOTIDÆ.

Toxotes jaculator Pallas.

Four specimens, Nos. 1293-1296 B. M., from Shortland Id., Solomons.

FAMILY PLATÆIDÆ.

Platax orbicularis Forskal.

Seven specimens, Nos. 1086*-1091 and 1155 B. M., from Shortland Id., Solomons.

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[7] The head, with the pectorals and ventrals of this very large Parrot-fish, was brought me by a native.

FAMILY CHÆTODONTIDÆ.

Forcipiger longirostris (Broussonet).

One specimen, No. 1562 B. M., from Raiatea, Society Ids.

Chætodon setifer Bloch.

One specimen, No. 740 B. M., length 8.16 in., from Tubuai, Austral Ids.

Three specimens, Nos. 893, 842*, 945* B. M., from Fatè, New Hebrides.

Two specimens, Nos. 1901 and 1902 B. M., from Rarotonga, Cook Ids.

Chætodon auriga Forskal.

One specimen, No. 1564 B. M., from Tahiti.

Chætodon vagabundus Linnæus.

One specimen, No. 978 B. M., from Fatè, New Hebrides.

One specimen, No. 1275 B. M., from Shortland Id., Solomons.

Three specimens, Nos. 1552-1554 B. M., from Raiatea, Society Ids.

Chætodon pelewensis Kner.

One specimen, No. 1000* B. M., from Fatè, New Hebrides.

Chætodon trifasciatus Bleeker.

One specimen, No. 1558 B. M., from Raiatea, Society Ids.

One specimen, No. 1190 B. M., from Shortland Id., Solomons.

Chætodon lunula Lacépède.

Three specimens, Nos. 1547-1549 B. M., from Raiatea, Society Ids.

Three specimens, Nos. 1888-1890 B. M., from Rarotonga, Cook Ids.

Five specimens, Nos. 2249-2253 B. M., from Nukuhiva, Marquesas Ids.

Two specimens, Nos. 2481* and 2482* B. M. from Makatea, Paumotu Ids.

One specimen, No. 1454 B. M., from Tahiti.

Chætodon flavirostris Günther.

One specimen, No. 958 B. M., from Fatè, New Hebrides.

Chætodon lineolatus Cuvier & Valenciennes.

One specimen and young, No. 946 B. M., from Fatè, New Hebrides.

Chætodon ulietensis Cuvier & Valenciennes.

Three specimens, Nos. 1555-1557 B. M., from Raiatea, Society Ids.

Chætodon unimaculatus Bloch.

Two specimens, Nos. 894 and 936* B. M., from Fatè, New Hebrides.

Chætodon ornatissimus Cuvier & Valenciennes.

Seven specimens, Nos. 1891-1897 B. M., from Rarotonga, Cook Ids.

Chætodon citrinellus Quoy & Gaimard.

One specimen, No. 1075 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 1559 and 1560 B. M., from Raiatea, Society Ids.

Two specimens, Nos. 1898 and 1899 B. M., from Rarotonga, Cook Ids.

One specimen, No. 1338 B. M., from Tahiti.

Chætodon reticulatus Cuvier & Valenciennes.

One specimen, No. 1563 B. M., from Raiatea, Society Ids.

One specimen, No. 1903* B. M., from Rarotonga, Cook Ids.

Chætodon ephippium Cuvier & Valenciennes.

Three specimens, Nos. 987, 989 and 990 B. M., from Fatè, New Hebrides,

Two specimens, Nos. 1550 and 1551 B. M., from Raiatea, Society Ids.

One specimen, No. 1900 B. M., from Rarotonga, Cook Ids.

Chætodon semeion Bleeker.

One specimen, No. 1324 B. M., from Shortland Id., Solomons.

Heniochus permutatus Cuvier & Valenciennes.
(*Heniochus chrysostomus* C. & V.)

One specimen, No. 1546 B. M., from Raiatea, Society Ids.

One specimen, No. 642 B. M., from Fatè, New Hebrides.

Holacanthus loriculus Günther.

One specimen, No. 1455 B. M., from Tahiti.

Holacanthus lineolatus Quoy & Gaimard.

One specimen, No. 1301 B. M., from Shortland Id., Solomons.

Holacanthus imperator Bloch.

One specimen, No. 1452 B. M., from Tahiti.

Holacanthus flavissimus Cuvier & Valenciennes.
(*Holacanthus cyanotis* Günther.)

One specimens, No. 1074 B. M., from Fatè, New Hebrides.

Holacanthus diacanthus (Boddaert).

One specimen, No. 1561 B. M., from Raiatea, Society Ids.

FAMILY ZANCLIDÆ.

Zanclus canescens (Linnæus).

One specimen, No. 1011* B. M., from Fatè, New Hebrides.

One specimen, No. 1313 B. M., from Shortland Id., Solomons.

One specimen, No. 1515 B. M., from Tahiti.

Three specimens, Nos. 1543-1545 B. M., from Raiatea, Society Ids.

FAMILY ACANTHURIDÆ.

Hepatus lineatus (Linnæus).

One specimen, No. 1576 B. M., from Raiatea, Society Ids.

Three specimens, Nos. 974, 1046, 1047 B. M., from Fatè, New Hebrides.

Three specimens, Nos. 1416-1418 B. M., from Tahiti.

Hepatus nigricans (Linnæus).
(*Chætodon gahhm* Forskal.)

Two specimens, Nos. 1501 and 1502 B. M., from Tahiti.

One specimen, No. 938 B. M., from Fatè, New Hebrides.

One specimen, No. 1108 B. M., from Shortland Id., Solomons.

One specimen, No. 1575 B. M., from Raiatea, Society Ids.

Hepatus achilles (Shaw).

One specimen, No. 1910 B. M., from Rarotonga, Cook Ids.

One specimen, No. 2460* B. M., from Makatea, Paumotu Ids.

Hepatus olivaceus (Forskal).

Eight specimens, Nos. 1400-1402*, 1403-1406* and 1500 B. M., from Tahiti.

Hepatus elongatus (Lacépède).

Depth 1.90; head 3.80; eye 4.20; D. IX, 22; A. III, 26.

Color in formalin, is a uniform brown, with a black spot in axis of anal and dorsal fin; fins darker than body.

Two specimens from Tubuai, Austral Ids.: No. 750 B. M., length 7 in.; No. 753 B. M., length 2.75 in.

Three specimens, Nos. 883, 967, 1028 B. M., from Fatè, New Hebrides.

Hepatus triostegus (Linnæus).

Twelve specimens, Nos. 1419-1426, 1571-1573*, 1517*, 1518 B. M., from Tahiti.

Five specimens, Nos. 884-886, 940 and 970 B. M., from Fatè, New Hebrides.

Three specimens, Nos. 1904-1907* B. M., from Rarotonga, Cook Ids.

Twenty-four specimens, Nos. 2175-2177 and 2235 B. M., from Nukuhiva, Marquesas Ids.

Hepatus guttatus (Forster).

Four specimens, Nos. 1503-1506 B. M., from Tahiti.

Ctenochætus striatus (Quoy & Gaimard).

Three specimens, Nos. 1512, 1513*, 1514 B. M., from Tahiti.

Two specimens, Nos. 1580-1581 B. M., from Raiatea, Society Ids.

One specimen, No. 1902 B. M., from Rarotonga. Cook Ids.

Three specimens, Nos. 980, 984 and 1048 B. M., from Fatè, New Hebrides.

One specimen, No. 754 B. M., from Tubuai, Austral Ids.

Two specimens, Nos. 1310* and 1312 B. M., from Shortland Id., Solomons.

Zebrasoma veliferum (Bloch).

One specimen, No. 1507 B. M., from Tahiti.

One specimen, No. 1573* B. M., from Raiatea, Society Ids.

Zebrasoma flavescens (Bennett).

Three specimens, Nos. 1577-1579* B. M., from Raiatea, Society Ids.

Acanthurus garretti (Seale).

Three specimens, Nos. 1497*-1499 B. M., from Tahiti.

Two specimens, Nos. 1567-1568 B. M., from Raiatea, Society Ids.

Three specimens, Nos. 1907*-1909 B. M., from Rarotonga, Cook Ids.

Acanthurus unicornis (Forskal).

Head 3.50; depth 2.10; length of horn measured from the orbit is slightly greater than width of eye.

Color, a uniform light gray; basis of the caudal peduncular keels blue; dorsal yellowish, with light blue oblique lines.

One specimen, No. 1442 B. M., from Tahiti.

Two specimens, Nos. 1569-1570 B. M., from Raiatea, Society Ids.

FAMILY SIGANIDÆ.

Siganus rostratus (Cuvier & Valenciennes).

One specimen, No. 748 B. M.., from Tubuai, Austral Ids.

One specimen, No. 1601 B. M., from Raiatea, Society Ids.

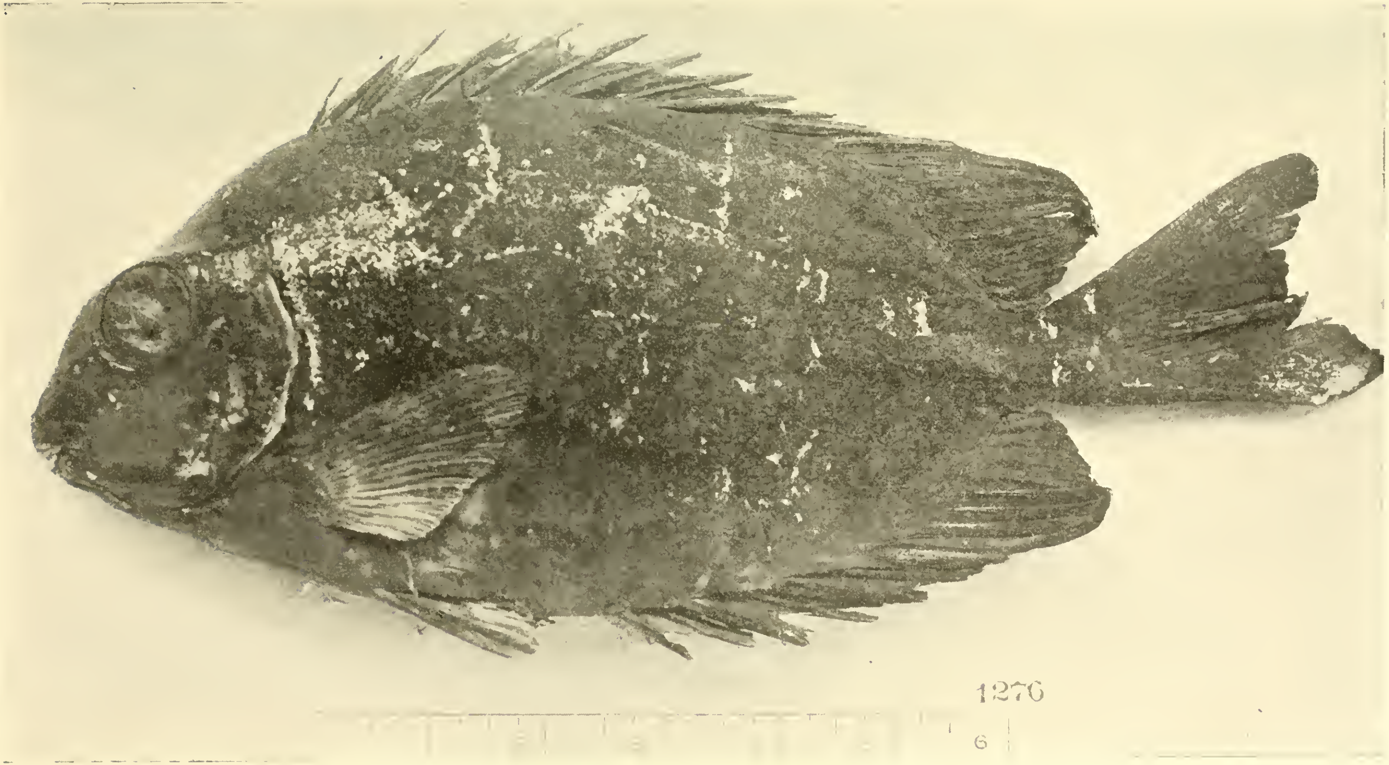

FIG. 17.—1276. Siganus shortlandensis Seale.

One specimen, No. 1068 B. M. from Fatè, New Hebrides.

Four specimens, Nos. 1133, 1134, 1135 and 1241 B. M., from Shortland Id., Solomons.

Siganus striolatus (Günther).

One specimen, No. 1600 B. M., from Raiatea, Society Ids.

Siganus vermiculatus (Cuvier & Valenciennes).

One specimen, No. 1277 B. M., Shortland Id., Solomons.

Siganus doliatus (Cuvier).

One specimen, No. 926 B. M., from Fatè, New Hebrides.

Siganus shortlandensis Seale, new species.

Depth 2.10; head 2.60; eye 3 in head; interorbital equal to eye; D. XIII, 10; A. VII, 9.

Body compressed, oblong, covered with fine scales; tail not armed; mouth moderate in size; a single row of fixed, sharp-pointed teeth, slightly flattened, 25 on each side; a decided convexity in the profile just in front of the eye; depth of caudal peduncle about equal to its length which is equal to the eye; the last dorsal spine is the longest, 2 in head, the second dorsal spine is equal to eye; the soft rays of both dorsal and anal are longer than the spines; pectoral 1.16 in head; ventrals 1.75 in head; base of anal 1.75 in base of dorsal; caudal is rather deeply emarginate, the middle ray 1.50 in the outer.

Color in life, bluish with yellow reticulating lines and dots, the lines are one-half as wide as the distal end of the maxillary; blue and yellow lines alternating on the cheeks; spinous dorsal and spinous anal with a yellowish wash; soft dorsal, soft anal and caudal with small brown dots.

Color in spirits is a dusky brown, the markings scarcely showing, the caudal, soft dorsal and anal are blackish, pectorals and ventrals have a bluish wash.

One specimen, No. 1276 (Fig. 17) B. M., from Shortland Id., Solomons.

Siganus zoniceps Seale, new species.

Depth 2.50; head 3.85; eye 3.75; interorbital equal to eye; snout 2 in head; D. XIII, 10; A. VII, 9.

Body oblong, compressed, with fine scales, no spine on caudal peduncle, no spine on tail; a single row of fine, sharp-pointed teeth in jaws, about 26 on each side; width of the upper lip at centre equal to pupil, its distal end 1.50 in pupil; profile not very convex in front of eye; depth of caudal peduncle 1.50 in its length; the fifth dorsal spine is the longest, 2.10 in head; second dorsal spine fully a third longer than width of eye; base of anal 1.70 in

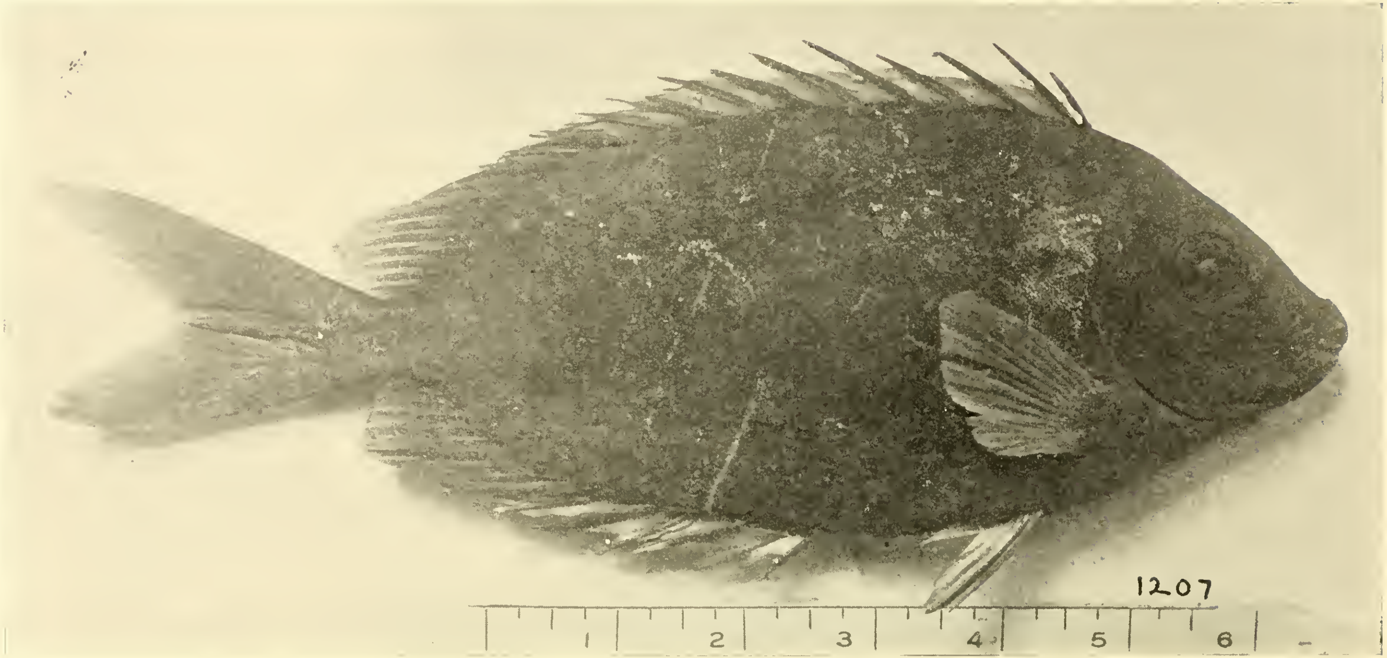
1207
1
2
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FIG. 18.—1207. Siganus zoniceps, Seale.

base of dorsal; pectorals 1.20 in head; caudal forked, the middle ray 2.25 in the outer.

Color in life, bright orange yellow with narrow blue lines and reticulations; a black band as wide as eye from the top of the head, through eyes and around the under jaw, small jet-black dots in the upper half of this band; dorsal, anal, caudal and pectorals bright yellow; ventrals whitish with a slight wash of yellow; some blue dots at base of caudal and on shoulders and thorax; snout a reddish brown.

Color in spirits, a dull grayish, the lower half yellowish, the upper half with a bluish wash; narrow bluish lines running longitudinally on the sides, vertically just back of the head, and forming circles on the belly; a black ocular band through the eye and around under jaw; upper part of head and snout dark; fins yellowish white, with a trace of blue.

Two specimens, Nos. 1207 (Fig. 18) and 1208 B. M., from Shortland Id., Solomons. No. 1207 is type of species.

Siganus marmoratus (Quoy & Gaimard).

One specimen, No. 1444 B. M., from Tahiti.

Four specimens from Fatè, New Hebrides.

Lo Seale, new genus.

This genus, typified by *Siganus vulpinus*, is characterized by greatly produced snout, which forms a short beak. The depth of the head is also much less than in *Siganus*, with which genus it agrees in general characters. The name *Lo* is used for the species of *Siganidæ* by the Samoans.

Lo vulpinus (Günther).

Depth 2.20; head 3.30; eye 4; interorbital equal to eye; snout 2 in head; scales minute; D. XIII, 10; A. VII, 9; V. 1-3-1.

Body compressed, snout produced, mouth small; a single row of small flat teeth fixed in each jaw, 12 on each side; opercles striate; none of the dorsal or anal spines greatly elongate; the dorsal spines, excepting the short anterior one, are of about equal length, the longest 2 in head; anal spines similar, the longest 2 in head; soft rays of dorsal 1.75 in head; ventrals 1.40 in head; caudal emarginate, the lobes rounded; caudal peduncle short, its depth equal to the eye.

Color in life is a light bistre brown; thorax and first ray of pectoral deep black; head and shoulders are a deeper brown than the body; caudal, dorsal and anal are orange; spines of ventrals and the first ray dusky; pectorals yellowish, with a slight dusky wash.

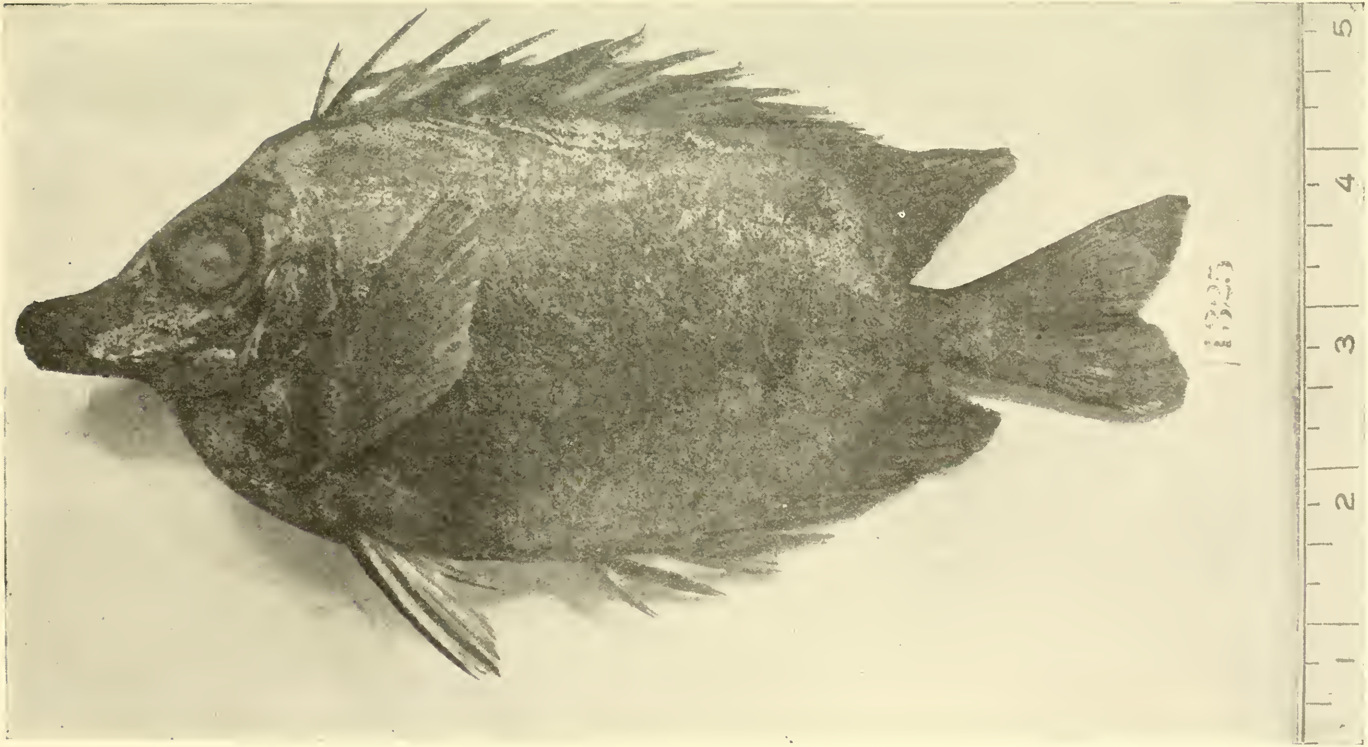

FIG. 19.—1325. Lo vulpinus (Günther).

Color in spirits, a dull grayish brown, thorax and head much darker; anterior ray of pectoral black; fins yellowish white.

One specimen, No. 1325 (Fig. 19) B. M., from Alu, one of the Solomon Ids. Length 7 in.

FAMILY BALISTIDÆ.

Xanthichthys rivulatus (Rüppell).

One specimen, No. 1085 B. M., from Fatè, New Hebrides.

In life the lines marking this species are bluish; in spirits they become light brownish.

Balistes fuscus Bloch.

Depth 2; head 3; eye 6 in head, 5 in snout, and 2 in interorbital space; D. III, 24; A. 23.

Body compressed, deep, covered with roughened scales, some osseous scutes behind gill openings; caudal peduncle without spines on its sides, its depth equal to interorbital space; a groove in front of eye; mouth rather small, teeth large, the anterior ones almost like canines. Fins: spinous dorsal with its first spine enlarged, its upper anterior half much roughened, its length 1.80 in base of soft dorsal; base of soft dorsal equal to head, base of anal not quite so long; pectorals equal in length to first dorsal spine; ventrals consisting of a single modified spine and some roughened corrugations; caudal deeply lunate, the margins greatly prolonged, the upper much the longest, the outer ray greater than length of head.

Color in life, blue, with a wash of green; dorsal blue, with a pink tip.

Color in spirits, uniform greenish brown, the soft fins tipped with white.

One specimen, No. 1359 B. M., from Tahiti. Length 21 in.

Balistes vidua Richardson.

One specimen, No. 2132 B. M., Nukuhiva, Marquesas Ids.

Balistes flavimarginatus Rüppell.

One specimen, No. 1290 B. M., from Shortland Id., Solomons.

Balistes bursa Bloch.

Two specimens, Nos. 2130, 2131 B. M., from Nukuhiva, Marquesas Ids.

Balistes chrysopterus Lacépède.
(*Balistes niger* Mungo Park.)

Three specimens, Nos. 1076, 1077* and 933 B. M., from Fatè, New Hebrides.

Balistes capistratus Shaw.

Three specimens, Nos. 2124-2127* B. M., from Nukuhiva, Marquesas Ids.

Balistapus undulatus (Mungo Park).

One specimen, No. 1480 B. M., was taken inside the reef at Papeete, Tahiti.

Three specimens, Nos. 965, 964 and 1050 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 1141* and 1164 B. M., from Shortland Id., Solomons.

Two specimens, Nos. 1588 and 1589 B. M., from Raiatea, Society Ids.

Balistapus aculeatus (Linnæus).

One specimen, No. 1336 B. M., from Tahiti. Length 4.75 in.

One specimen, No. 1987 B. M., from Rarotonga, Cook Ids.

Six specimens, Nos. 846, 889, 890*-892, and 936* B. M., from Fatè, New Hebrides.

Two specimens, Nos. 1586 and 1587 B. M., from Raiatea, Society Ids.

Two specimens, Nos. 2127* and 2128 B. M., from Nukuhiva, Marquesas Ids.

Balistapus verrucosus (Linnæus).

Two specimens, Nos. 1239 and 1216 B. M., from Shortland Id., Solomons.

Balistapus rectangulus (Bloch).

Two specimens, Nos. 876 and 882 B. M., from Fatè, New Hebrides.

One specimen, No. 2229* B. M., from Nukuhiva, Marquesas Ids.

FAMILY MONACANTHIDÆ.

Monacanthus fatènsis Seale, new species.

Depth 1.75; head 3.25; eye 4 in head; 3.75 in the first dorsal spine; interorbital very convex, 3 in head; snout 1.10 in head; D. I, 34; A. 31.

Body compressed, without scales, velvety to the touch; upper profile of the snout concave; a single dorsal spine without barbs and scarcely roughened, its length 1.20 in head; the origin of the first dorsal spine is anterior of eye; snout somewhat produced, equal to length of the first dorsal spine; four rather long cutting teeth in lower jaw, six in the upper; base of soft dorsal 2.60 in length of fish without caudal; distance between anterior base of dorsal spine and base of soft dorsal is equal to the base of anal; a small movable ventral spine present with about two barbs on each side; depth of caudal peduncle equal to its length.

Color in spirits is a dull brown, without darker mottlings, a bright blue spot about the vent; soft dorsal and anal yellow, caudal brown, pectorals yellowish, iris yellowish.

One specimen, No. 997 (Fig. 13) B. M., from Fatè, New Hebrides.

Monacanthus spilosomus (Bennett).

One specimen, No. 1916 B. M., from Rarotonga, Cook Ids.

FAMILY OSTRACIIDÆ.

Ostracion cornutum Linnæus.

Two specimens, Nos. 1333 and 1334 B. M., from Tahiti.

One specimen, No. 1156* B. M., from Shortland Id., Solomons.

Ostracion dexteri Seale, new species.

Carapace expanded and rounded below; the lower lateral margin with three spines on each side; a prominent spine over each eye, another on the middle of the back, flanked on each side by two others, in all eleven large spines; eye equal to the spine above it; forehead and interorbital space concave.

Color, greenish above, yellowish below. Length 1 in.

One specimen, No. 1526 (Fig. 7) B. M., from Bellingshausen Id. of the Society group. Named for the donor, Captain George Dexter, of Tahiti.

Ostracion chryseres Seale, new species.

Depth 3.75; head 4; eye 3.50 in head, 2.50 in interorbital space; D. 10; A. 9; P. 10; C. 10; interorbital 1.20 in head; snout 1.50 in head.

Body a four-sided carapace without spines; back rounded; interorbital space slightly concave; ventral ridges more prominent than dorsal; length of carapace behind dorsal fin 2 in head; a hump on the snout above the mouth, and a fleshy hump of about equal size on the under jaw; teeth, 10 in each jaw, these are rather flat and weak, brownish in color; scutes large, 10 on each side; base of dorsal fin 2 in its height; base of anal 2.20 in its height; pectorals 1.20 in head; caudal 1.10 in head.

Color in life is olive brown, with dark round dots the size of pupil, in the centre of each scute of the back and the upper row of scutes of the side; sides of head with yellow margins to the scutes, some yellow lines back and above the pectorals, and a yellow line extending back from base of pectorals to the middle of the body; sides of the caudal peduncle a bright yellow, dusky on top; base of dorsal black; fins whitish, with dark dots.

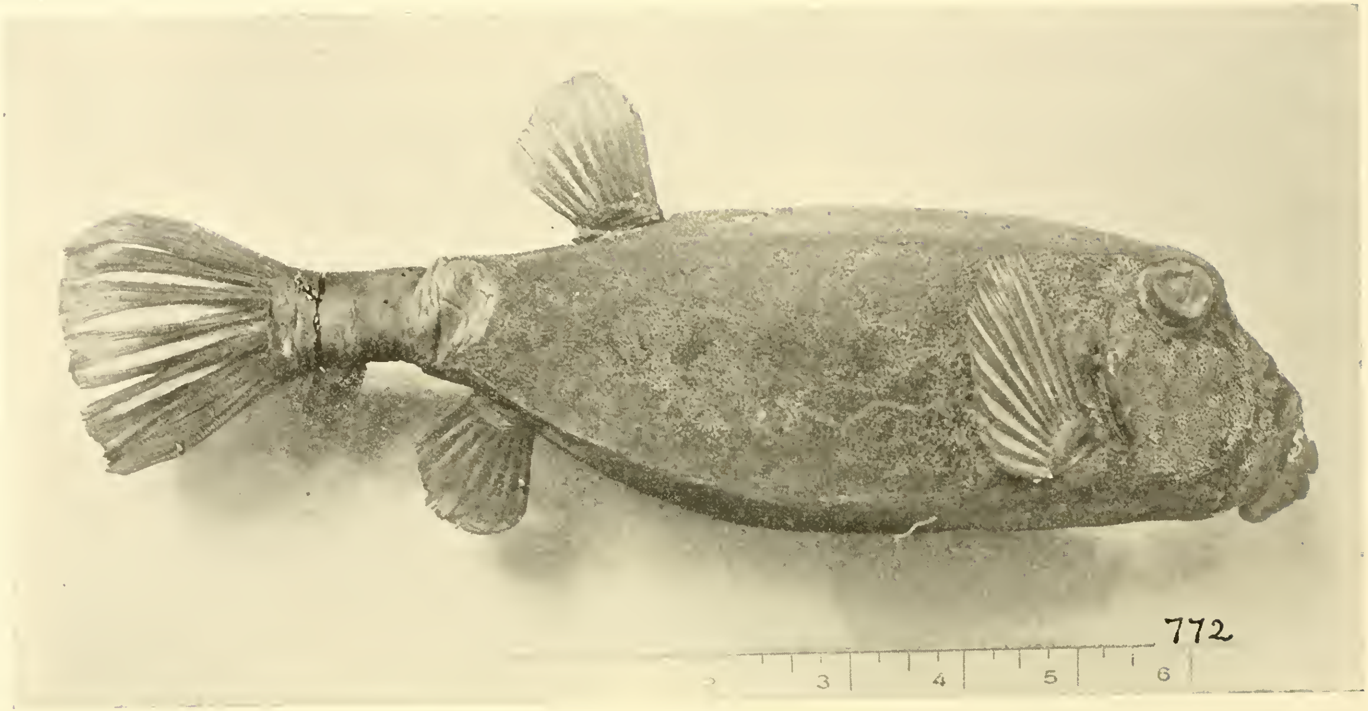

FIG. 20.—772. Ostracion chryseres Seale.

Color in spirits is a dull bistre brown, with slightly darker centres to the scutes; the yellow lines on cheeks and sides fading to a dull yellowish white; top of caudal peduncle dusky; there is also a slight wash of dusky on the base of caudal fin and on the ventral surface of the caudal peduncle; the lower half of dorsal has a few dark dots, otherwise fins yellowish white.

One specimen, No. 772 (Fig. 20) B. M., from Tubuai, Austral Ids. Length 10.50 in.

Ostracion auricauda Seale, new species.

Depth 3; head 4.50; ventral width 3.28; eye 3.10 in head; interorbital concave, 1.19 in head; snout 1.50; a very prominent hump above mouth; D. 10; A. 10.

Carapace four-ridged without spines, the lower ventral ridges most prominent; length of carapace behind dorsal fin 1.75 in head; depth of caudal peduncle 2 in its length; scutes large, 10 along upper lateral ridge, 7 from nuchal region to base of dorsal; a rather prominent convex swelling on carapace just in front of vent; the anterior tip of carapace at snout forms an angle of 60°; teeth consisting of 10 roundish brown teeth in lower jaw and 8 in upper; base of dorsal entirely in front of anal; base of dorsal 2.75 in head, its longest ray 1.20; base of anal equal to eye, its rays 1.45 in head; base of pectorals equal to eye, its longest ray 1.10 in head; caudal slightly rounded, its mid-ray greater than head.

Color in life, a light bistre brown, the plates of the back and upper row of sides with a single blue, dark-edged spot; caudal peduncle a bright golden yellow, four or five reticulating yellow lines on sides of head. Fins: all with a wash of orange, the base of dorsal only with a few small black dots.

Color in spirits, light brown, the fins yellowish white; occelli of back dim and not showing blue centres; caudal yellowish white; the yellow lines on side of head faded to whitish; dots on base of dorsal conspicuous.

One specimen, No. 808 (Fig. 21) B. M., from Mangareva Id. Length 14 in.

Ostracion sebae Bleeker.

One specimen, No. 1073 B. M., from Fatè, New Hebrides.
One specimen, No. 1988 B. M., from Rarotonga, Cook Ids.
One specimen, No. 1335 B. M., from Tahiti.

Ostracion renardi Bleeker.

One specimen, No. 1996 B. M., from Rarotonga, Cook Ids.
One specimen, No. 2120 B. M., from Nukuhiva, Marquesas Ids.

Ostracion tuberculatum Linnæus.

Two specimens, Nos. 1590 and 1591 B. M., from Raiatea, Society Ids.

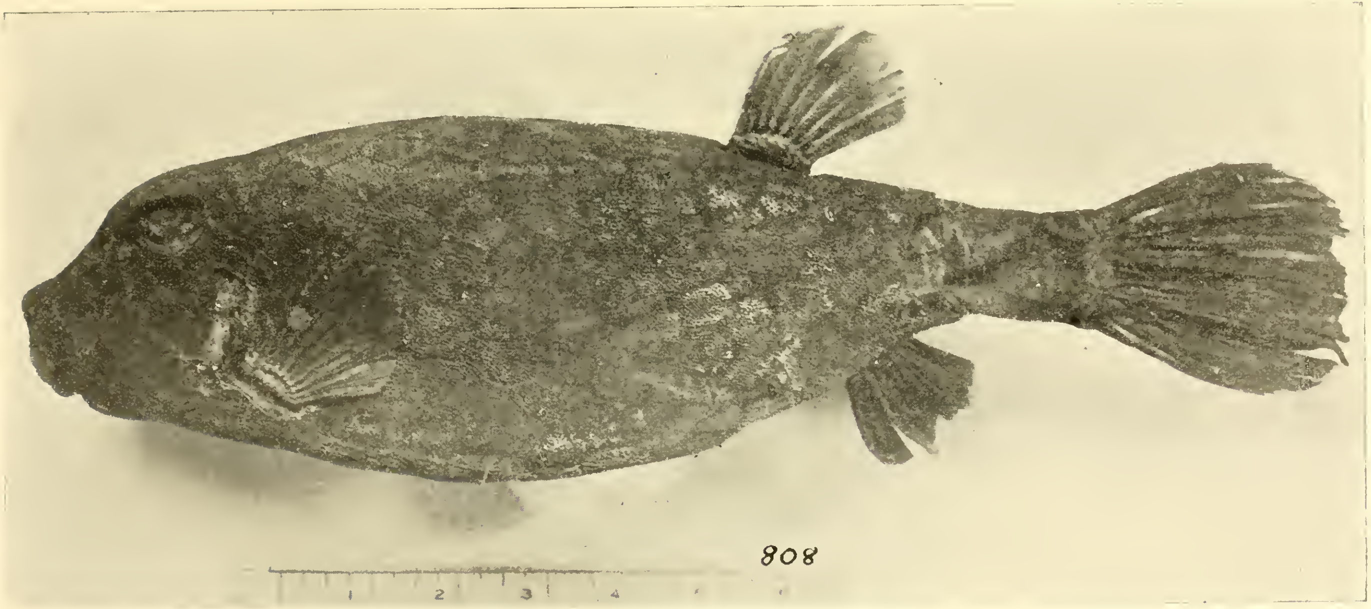

FIG. 21.—808. Ostracion auricauda Seale.

One specimen, No. 1989 B. M., from Rarotonga, Cook Ids.

Two specimens, Nos. 2118, 2119 B. M., from Nukuhiva, Marquesas Ids.

Ostracion lentigenosum Bloch & Schneider.

Two specimens, Nos. 969, 1051 B. M., from Fatè, New Hebrides.

Two specimens, Nos. 2116, 2117 B. M., from Nukuhiva, Marquesas Ids.

FAMILY TETRADONTIDÆ.

Spheroides hypselogenion (Bleeker).

One specimen, No. 888 B. M., from Fatè, New Hebrides.

Spheroides oblongus (Bleeker).

One specimen, No. 939 B. M., from Fatè, New Hebrides.

Tetraodon setosus Rosa Smith.

One specimen, No. 836 B. M., from Mangareva Id. Length 9 in.

This specimen is identified with some doubt with this species, which belongs to the Panama fauna.

Tetraodon immaculatus Bleeker.

One specimen, No. 881 B. M., from Fatè, New Hebrides.

One specimen, No. 1317 B. M., from Shortland Id., Solomons.

In life the specimen is a uniform bright yellow, with black on basis of the pectorals, a black spot on the upper part of dorsal and on middle of caudal.

Tetraodon aerostaticus Jenyns.

One specimen, No. 1057 B. M., from Fatè, New Hebrides.

Tetraodon lacrymatus (Quoy & Gaimard).

One specimen, No. 1592 B. M., from Raiatea, Society Ids.

Canthigaster compressus (Procé).

One specimen, No. 1065 B. M., from Fatè, New Hebrides.

Canthigaster solandri (Richardson).

One specimen, No. 1593 B. M., from Raiatea, Society Ids.

FAMILY SCORPÆNIDÆ.

Merinthe haplodactyla (Bleeker).

One specimen, No. 1012 B. M., from Fatè, New Hebrides.

Scorpæna cooki Günther.

Three specimens, No. 1681 B. M. (young), from Raiatea, Society Ids.

Scorpænopsis quiescens Seale, new species.

Depth 3; head 2.50; eye 3.50; D. XIII, 19; A. III, 5; P. 18; V. I, 5; interorbital space concave, equal to the snout.

Body compressed, its greatest depth is between the first and fifth dorsal spines; lateral line complete, the tubules prominent; depth of the caudal peduncle equal to the orbit. Head large, slightly compressed and well armed with spines distributed as follows: three on the upper rim of orbit, one just above the posterior rim of orbit, four on the nuchal region , three on a line with the posterior end of the lateral line, two on the posterior margin of the opercles, four which constitute the bony stay across the cheeks, the posterior one of these four is a large one on the preopercle, and has two spines below it; there is a blunt spine on the suborbital overhanging the premaxillary; there are several dermal flaps, the largest one is branched and situated over the anterior nostril; snout short and rather blunt; lips equal; maxillary reaching to below the posterior margin of orbit, 1.90 in head, its distal end 1.50 in orbit; teeth in villiform bands on jaws and vomer, none on the palatines. Fins: the notch of the dorsal fin is one-half the depth of the fin, the fifth dorsal spine is the longest, 2.20 in head; second anal spine longest and strongest, 1.60 in head; pectorals 1.60 in head; length of ventrals and caudal equal.

Color: the fish is mottled all over with yellowish brown, and white, a dusky clotch on upper part of opercles. Fins colored like the body.

One specimen, No. 1352 (Fig. 2, No. 783*) B. M., from Tahiti. Length 3.50 in.

Sebastapistes strongensis (Cuvier & Valenciennes).

Two specimens, Nos. 1054 and 1055 B. M., from Fatè, New Hebrides. Doubtfully referred to this species.

Sebastapistes guamensis (Quoy & Gaimard).

One specimen, No. 1524 B. M., from Tahiti.

One specimen, No. 2380 B. M., from Nukuhiva, Marquesas Ids.

Two specimens, Nos. 1014* and 1016* B. M., from Fatè, New Hebrides.

Two specimens, Nos. 1196 and 1223 B. M., from Shortland Id., Solomons.

Sebastapistes baillieui (Vaillant & Sauvage).

One specimen, No. 2379 B. M., from Nukuhiva, Marquesas Ids. Rather doubtfully identified.

Genus **Deleastes** Seale, new genus.

This genus, typified by *D. dæctor*, is related to *Synanceia*, being distinguished by the much smaller ventrals, situated more posteriorly than in *Synanceia*. The skin is smooth, and apparently free from dermal flaps and excrescences except at base of dorsal and anal fin.

Deleastes dæctor Seale, new species.

Depth at origin of dorsal 2.45; head 2.20; eye 8.05 in head, 2.20 in interorbital space, 2 in snout; D. XIII, 6; A. III, 5; interorbital space with a deep fossa, also a deep fossa just posterior of each eye.

Body compressed posteriorly; no scales and apparently no dermal flaps; head monstrous, without spines; mouth large, opening on the dorsal profile; villiform teeth in both jaws; no teeth on vomer or palatines; the distal width of the maxillary is slightly greater than orbit; dorsal fin continuous, its origin directly above the origin of ventrals; the base of the spinous portion of the dorsal is more than four times as long as the base of the soft dorsal; anal short, its base 2.10 in head, the spinous portion covered with fleshy excrescence; the posterior margin of the pectoral is twice the length of the fin, the upper axis of the fin is exactly over the middle of the posterior margin of the fin and its lower anterior origin is in advance of the origin of ventral, also in front of a line with eye; the posterior margin of the pectoral is slightly greater than length of head; ventrals very short, 2.15 in head; caudal small, rounded, its middle ray equal to length of ventrals; all the fins are fleshy.

Color in life, mottled everywhere with olive brown or dark green; caudal, pectorals and anal banded with whitish lines.

In this species the ventrals are smaller, and situated more posteriorly than in other species of *Synanceia*, the skin also is much smoother and is apparently free from fleshy excrescences except at base of dorsal and anal.

One specimen, No. 1360 (Fig. 22) B. M., from Tahiti. Length 10.5 in.

Synanceia verrucosa (Bloch).

Depth 2.75; head 2.50; eye 9; D. XIII, 6; A. III, 5; interorbital space 4 in head; snout less than width of the interorbital space.

Body subcylindrical, covered with lichen-like fleshy excrescences and dermal flaps; head monstrous; interorbital space very concave; a groove on cheeks below the eye and a deep fossa behind each eye; no spines on the head; premaxillary thin, its length 2.50 in head; distal width of the maxillary slightly greater than orbit; the anterior extremity of the lower jaw is on the dorsal profile; villiform teeth in jaws, none on the vomer or palatine; opercles without spines; the dorsal fin is continuous, the spinous portion with much the longest base, the origin of the dorsal is over the

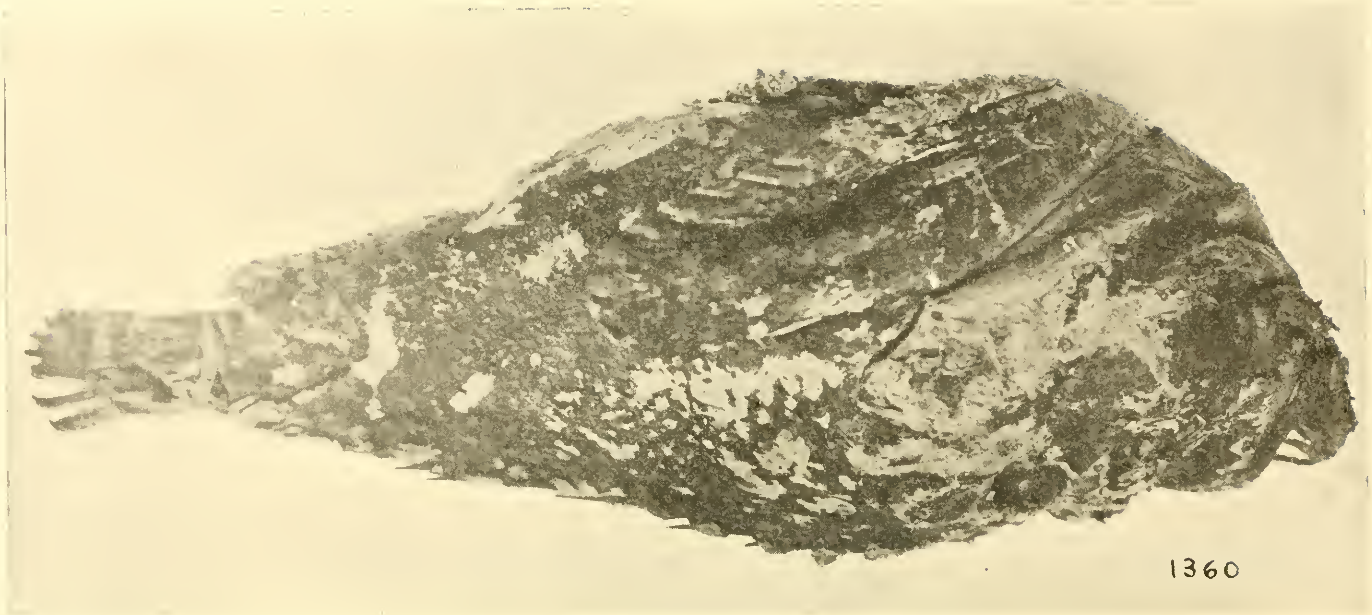

FIG. 22.—1360. Deleastes dæctor Seale.

posterior third of opercle and about on a line with the middle of the ventrals; anal short, the base is less than length of ventrals, being 2.10 in head; the pectorals are very long, the lower posterior border being 1.80 in length of fish without caudal, the upper margin of fin is 1.50 in head, the upper part of the axis being over the middle of lower margin of the fin; the origin of the pectoral is anterior of the eye, being below the middle of the snout, its tip reaches to a line with the eleventh dorsal spine; ventral fins are of moderate size, 1.20 in head, their origin is on a line with the eye; caudal fin rounded, 2.30 in head.

Color in life, gray, with orange-colored spots on sides of body, in axis of pectorals, on chin, and a spot below each eye.

One specimen, No. 733 B. M., from Tubuai, Austral Ids.

Amblyapistus tænianotus (Cuvier & Valenciennes).

One specimen, No. 1258 B. M., from Shortland Id., Solomons.

Pterois antennata (Bloch).

One specimen, No. 1566 B. M., from Raiatea, Society Ids.
One specimen, No. 2480* B. M., from Makatea, Paumotu Ids.
One specimen, No. 1531 B. M., from Tahiti.

Pelor didactylum Cuvier & Valenciennes.

One specimen, No. 963 B. M., from Fatè, New Hebrides.

FAMILY CEPHALACANTHIDÆ.

Cephalacanthus orientalis (Linnæus).

One specimen, No. 1361 B. M., from Tahiti.

FAMILY ECHENEIDIDÆ.

Leptecheneis flaviventris Seale, new species.

Depth 11.50; head 5.25; D. XXIV, 34; A. 33; eye 6.75; interorbitals 2.50 in disk; breadth between pectorals 8; disk 4.10 in length without caudal; width of disk 3 in its length; snout 2.20 in head; distance from angle of jaw to tip of lower jaw, 2.60 in head; pectorals 1.10; ventrals 1.40; mid caudal ray 1.60; longest anal ray 1.55; longest dorsal ray 1.75; caudal lunate.

Body elongate; head with a disk of 24 lamellæ on its dorsal surface; teeth consisting of bands of small teeth in jaws and palate; tongue roughened with asperites; pectorals pointed; inner rays of ventrals narrowly adnate to abdomen; dorsal and anal beginning and ending opposite to each other.

Color, brown, belly and under surface of head yellowish; a dark stripe around jaws which unites at angle into a single band as wide as eye and extends to base of pectorals; ventrals yellowish;

anterior base of anal yellowish; the lower part of pectorals and their axis yellowish; otherwise the fins are uniform with the color of the body.

This species is allied to *Leptecheneis naucrates* (Linnæus), but is easily distinguished by the yellow color of the belly, the smaller eye, the greater length of the anal and dorsal rays.

One specimen, Type No. 834* (Fig. 23) B. M., from Mangareva Id. Length 24.25 in.

Periophthalmus barbarus Gmelin.

One specimen, No. 1056 B. M., from Fatè, New Hebrides.

Eleotris fusca (Bloch).

One specimen, No. 1337 B. M., from Tahiti.

Two specimens, Nos. 743, 745, B. M., from Tubuai, Austral Ids.

One specimen, No. 2363 B. M., from Nukuhiva, Marquesas Ids.

Gobius ornatus Rüppell.

One specimen, No. 1253 B. M., from Shortland Id., Solomons.

FAMILY GOBIIDÆ.

Gobius oligolepis (Bleeker).

Three specimens, Nos. 856, 857* and 1080* B. M., from Fatè, New Hebrides.

Mapo soporator (Cuvier & Valenciennes).

Three specimens, Nos. 2496*, 2497*, 2498* B. M., from Makatea, Paumotu Ids.

One specimen, No. 1525 B. M., from Tahiti.

Five specimens, Nos. 2374-2376* and 2378 B. M., from Nukuhiva, Marquesas Ids.

Coryphopterus criniger Cuvier & Valenciennes.

Two specimens, Nos. 1023, 1678 B. M., from Raiatea, Society Ids.

Odontogobius phalaena Bleeker.

Four specimens, Nos. 854, 1013, 1081* and 1082 B. M., from Fatè, New Hebrides.

Awaous crassilabris (Günther).

Two specimens, Nos. 1195* and 1207 B. M., from Shortland Id., Solomons.

Awaous puntangoides (Bleeker).

One specimen, No. 1283 B. M., from Shortland Id., Solomons.

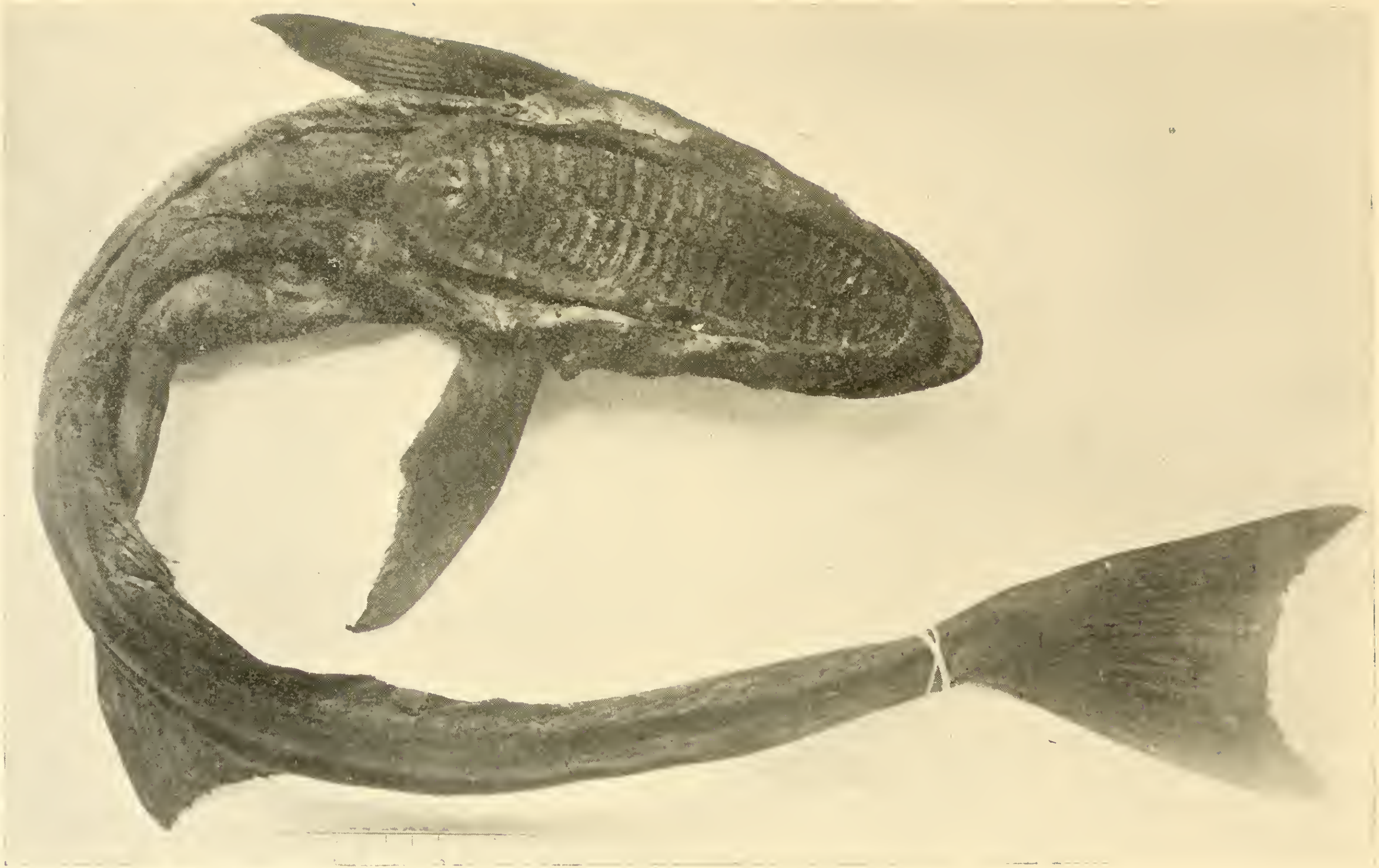

FIG. 23.—834. Leptecheneis flaviventris Seale.

FAMILY PLEURONECTIDÆ.

Platophrys mancus (Broussonet).

One specimen, No. 1353 B. M., from Tahiti.

One specimen, No. 1990 B. M., from Rarotonga, Cook Ids.

One specimen, No. 2499* B. M., from Makatea, Paumotu Ids.

One specimen, No. 730 B. M., from Tubuai, Austral Ids.

Two specimens, Nos. 1292* and 1218 B. M., from Shortland Id., Solomons.

FAMILY SOLEIDÆ.

Pardachirus pavonius (Lacépède).

One specimen, No. 898* B. M., from Fatè, New Hebrides.

FAMILY PTEROPSARIDÆ.

Parapercis xanthozona (Bleeker).

One specimen, No. 1225 B. M., from Shortland Id., Solomons.

FAMILY BLENNIIDÆ.

Salarias edentulus (Bloch).

Two specimens, No. 855 B. M., from Fatè, New Hebrides.

One specimen, No. 2502* B. M., from Makatea, Paumotu Ids.

Three specimens, Nos. 2341-2343 B. M., from Nukuhiva, Marquesas Ids.

Salarias meleagris Cuvier & Valenciennes.

One specimen, No. 2338 B. M., from Nukuhiva, Marquesas Ids.

Eleven specimens, Nos. 2516-2526 B. M., from Makatea, Paumotu Ids.

Salarias lineatus Bleeker.

One specimen, No. 1086* B. M., from Fatè, New Hebrides.

This differs from Bleeker's description in having the orbital tentacle fringed instead of simple.

Salarias coronatus Günther.

Two specimens, Nos. 2339-2340 B. M., from Nukuhiva, Marquesas Ids.

Salarias quadricornis Forster.

One specimen, No. 802 B. M., from Mangareva Ids.

Three specimens, Nos. 1998*2000 B. M., from Rarotonga, Cook Ids.

Forty-seven specimens, Nos. 2285-2331 B. M., from Nukuhiva, Marquesas Ids.

Thirteen specimens, Nos. 2503-2515 B. M. from Makatea, Paumotu Ids.

One specimen, No. 1679 B. M., from Rarotonga, Cook Ids.

Salarias hasselti Bleeker.

One specimen, No. 1063 B. M., from Fatè, New Hebrides.

Salarias caudolineatus (Günther).

One specimen, No. 2501* B. M., from Makatea, Paumotu Ids.

One specimen, No. 2332 B. M., from Nukuhiva, Marquesas Ids.

Salarias marmoratus Bennett.

Five specimens, Nos. 2333-2337 B. M., from Nukuhiva; Marquesas Ids.

Salarias azureus Seale, new species.

Depth 4.50; head 4.30; eye 3.20; D. XII, 24; A. II, 22; interorbital 2 in eye; simple unfringed orbital tentacle slightly longer than width of interorbital, a similar one on nuchal region; a rather prominent tentacle at nostril with six fringes; no crest on head.

Body elongate cylindrical, without scales; lateral line strongly bent, 3.50 in length of fish without the caudal, it ends under the last dorsal spine; the anterior profile of head is almost vertical; mouth inferior; teeth numerous, pectinate, no canines; dorsal fin deeply notched, its origin is directly over the origin of the lateral line, the fin is attached to the caudal by a membrane, the longest spine is 1.75 in depth of fish; base of anal 1.90 in length of fish, its longest ray equal to longest dorsal spine; pectorals rounded, equal to length of head, tips of the rays free; caudal rounded, equal to the depth of the fish.

Color in life is uniform purplish, with a few scattered darker blotches.

Color in spirits, a striking livid blue, with six indistinct darker blue blotches along the back and sides; fins brown, with a slight wash of bluish; the dorsal with three lines of small brown dots along the margin and with fine oblique brownish lines on the soft dorsal; anal with a fine margin of pure white, and with a submarginal area of deep blue, two lines of blue dots along the middle of the fin; caudal, pectoral and ventral without markings.

One specimen, a female, No. 783 (Fig. 8) B. M., from Tubuai, Austral Ids. Length 4.50 in.

This species is nearly related to *S. quadricornis*.

Salarias tubuensis Seale, new species.

Depth 5; head 5; eye 3.20; D. XIII, 21; A. 22; a fringed tentacle over nostril, and a simple orbital tentacle, less in length than width of interorbital space; no nuchal tentacle or crest.

Body elongate, cylindrical, without scales; lateral line but slightly curved, ending under the ninth dorsal spine, its length 3.50 in total length without caudal; profile and head slanting obliquely back to the inferior mouth, the opening of the mouth being below the eye; teeth fine, pectinate, no canines; dorsal fin deeply notched, its origin over the posterior margin of the opercles, longest dorsal spine 1.40 in head, the longest ray 1.20; base of anal 2.55 in length, its longest ray 1.70 in head; ventrals short, equal to the post ocular part of head; caudal square, equal to length of the head.

Color in spirits is a light blue, with seven bands of darker blue about as wide as interspaces, which extend over the back and down on sides, dividing below the median line into two; dorsal fin white with some indistinct pale blue spots on rays; anal white, with a pale blue intermarginal line, and a margin of white; pectorals and ventrals white.

One specimen, No. 784 (Fig. 8) B. M., from Tubuai, Austral Ids.

Salarias cæsius Seale, new species.

Depth 5.75; head 5.50; D. XIV, 17; A. II, 22; eye 3.50; orbital tentacle wide, with five fringes; its length less than eye; a dermal crest, the length of which is 2.30 in head.

Body elongate, cylindrical; lateral line short, slightly curved, ending under the sixth dorsal spine; depth of head equal to its width, 1.50 in its length; profile almost vertical, the upper portion not produced; mouth inferior; teeth numerous, small, pectinate, no canines; dorsal fin deeply notched, not continuous on to the caudal, its origin directly over the origin of the pectorals. base of anal 2.10 in length of head; ventrals 1.75 in length of head.

Color in spirits is a dull drab, with seven darker double bands which extend over the back and down the sides; three distinct oblique, brown lines on the side of throat; ventral surface with a slight tint of pale blue; a brown spot on the middle of the base of caudal, with a bluish band on the fin just posterior of the spot; six dusky blotches on the spinous dorsal, and four on the soft dorsal, these lines may extend as dots almost to the top of the fin; the anterior dark blotch at the base of first and third dorsal spines is the most distinct; anal white, with a pale blue intermarginal line; pectorals and ventrals white; iris blue.

The sexes are similar.

Five specimens, one male and four females. No. 785 B. M. is type of the species. From Tubuai, Austral Ids.

Alticus saliens (Lacépède).

Fourteen specimens, Nos. 2349-2362 B. M., from Nukuhiva, Marquesas Ids.

Petroscirtes rhinorhynchus Bleeker.

One specimen, No. 1066 B. M., from Fatè, New Hebrides.

Petroscirtes tapeinosoma Bleeker.

One specimen, No. 1044 B. M., from Fatè, New Hebrides.

One specimen, No. 1677 B. M., from Raiatea, Society Ids.

One specimen, No. 2265 B. M., from Nukuhiva, Marquesas Ids.

FAMILY ANTENNARIDÆ.

Antennarius lutescens Seale, new species.

Depth 2; head 2.75; eye 8 in head, 3 in interorbital space; D. I-I, 12; A. 8; P. 12; V. 5; skin rough; interorbital equal to the first dorsal spine (not tentacle).

Body compressed, caudal peduncle deep, 2.15 in head, its depth greater than length of the tentacle; head large, the upper profile roughened and with its anterior tip concave; mouth very large, wide open the distance between the tips of the jaws is equal to the length of the head; snout short, less than width of interorbital space; length of maxillary equal to distance from middle of eye to posterior margin of opercle; width of distal end of maxillary is greater than orbit; about two-thirds of the maxillary is exposed; length of mandible 1.20 in head, the knob at symphysis prominent; teeth in the jaws minute, those in the palatine slightly larger; two patches of cardiform teeth on upper and lower pharyngeals; the tentacle is of moderate length, 2.30 in head and reaching a little beyond the first dorsal spine, it has a single fleshy caruncle at the tip; the first dorsal spine (not tentacle) is equal to interorbital space and is less than depth of caudal peduncle, its origin is directly above middle of eye; the second dorsal spine is covered with a fleshy excrescence; length of the longest dorsal and anal rays about equal, 2 in head; length of ventrals 2.20 in head; caudal rounded, its length 3.20 in body.

Color in life, a uniform raw sienna yellow, no spots except a dusky blotch on inner side of pectoral fin.

One specimen, No. 1347 B. M., from Tahiti. Length 5.50 in.

This species is characterized by the large mouth, depth of caudal peduncle, shortness of tentacle, and more posterior location of the second dorsal spine, and the difference in coloring.

Antennarius commersonii (Lacépède).

One specimen, No. 1220 B. M., from Shortland Id., Solomons.

Antennarius hispidus Bloch.

One specimen, No. 1676 B. M., from Raiatea, Society Ids.

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Vol. IV.—No. 2.

Director's Report for 1907.

HONOLULU, H. I.
Bishop Museum Press.
1908.

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TO THE TRUSTEES OF THE BERNICE PAUAHI BISHOP MUSEUM.

Sirs:—In accordance with the standing vote of the Trustees, I submit my Annual Report on the present condition of this Museum and the work done or planned in the various departments during the year 1907.

WILLIAM T. BRIGHAM,
Director of the Museum.

Honolulu, February 14, 1908.
Ordered printed July 10, 1908.

REPORT

WHILE it is most gratifying to a Director to report substantial gains and general prosperity of the institution in his charge, no such officer can escape the general law of changing light and shade, and he must at times recognize the fact that there are seasons when the results are not in proportion to the labor expended and not such as each member of the Museum staff has honestly and industriously striven to attain.

Such has been the year just closed. Perhaps of all the few years of the life of this Museum hitherto the one of which it must be admitted that we cannot marshal this list of accessions, that table of attendance, an increased number of workers, better accommodation for the work, or even many additional attractions for the amusement or instruction of the public.

While Mr. Otto H. Swezey has joined us as honorary Curator of Entomology, and Miss E. Schupp as Librarian, we have lost Mr. W. A. Bryan who, early in the year was reappointed Taxidermist and Curator of Ornithology for six months, this term expiring July 31st. Both our publications and our exhibition cases will suffer from the loss, and it will be difficult to fill the place of so active and successful a worker. Mr. L. G. Blackman, who has for years been a most acceptable librarian and general assistant, listened to the lure of his favorite occupation of teaching and left us to become head master of the recently founded Aliiolani College in this city. The Museum has lost strength in his departure. Mr. Hugh F. Sturtevant, who has for several summer vacations acted as Assistant, to our great satisfaction, died of typhoid fever not long after his return to his regular school work on Honokaa, Hawaii, and every member of the staff mourns the loss of a colleague and dear friend.

The Curatorship of Ornithology has not been filled, although there have been applications for the position, because with the limited income of the Museum it is impossible to fill all the positions that should be made in a museum of the size and rank of this institution, and, as much work had been done on the collection and preservation of birds until the specimens were very numerous and the portion of our library devoted to this branch was rich in the working literature of ornithology, it seemed better to turn our limited powers to some other department where a skilled worker was greatly needed, and such an one was unquestionably Botany. Not only do our valuable collections need the care of an expert, but they should be so increased that by exchange we could acquire ample specimens of the Polynesian flora on other groups, such as New Zealand, Tahiti, Samoa and Tonga. With the exception of a good collection of New Zealand ferns we have nothing from the rest of the Pacific, and as we have few, if any, botanists on this group, the Director finds great difficulty in answering the frequent requests for specimens or definite botanical information. With a competent botanist we could be of no little use to many institutions and botanical workers abroad as well as able to acquire new material in this line for our herbarium and cases. Our library should be largely increased in botanical literature, although it is already not to be despised. Still there are whole families of Hawaiian plants needing thorough study and illustration, such as the very remarkable and interesting tree lobelias so important a part of the Hawaiian flora. I had hoped to take this in hand myself and had collected much material for illustration and had prepared a few colored plates, but the pressing work of administration has hitherto made the prosecution of such a great work impossible for me, and I had thought perhaps if a suitable botanist and collector could be obtained, I might attempt to finish this task. Some one should do this, for at present the family is in sad confusion and needs ample revision and illustration. It would add greatly to the value of our publications could a monograph on the Hawaiian Lobeliaceæ be issued from our press. I have for some months been conducting negotiations looking to securing such a botanical assistant.

We also greatly need a marine zoologist, not only to work on our reefs and study the many undescribed or little known species of marine life, but to complete the grand collection of fishes which so far as shown in the admirably colored casts prepared by Mr. J. W. Thompson, our artist, greatly interest and delight our visitors, but more important still add to the known species, and increase our knowledge of species already named. As a single instance, during the past year has been added to our collection a large eel common in Samoan waters, but never before reported from these islands: nor is this a solitary case; in many other specimens in our collection of casts we have either found new species, or old species for the first time reported from these waters.

If we had the income needed to secure the additional workers we have not at present, nor do I see any immediate prospect of securing such conveniences as are necessary for their work, let alone space within the Museum walls for storage of the specimens they may be expected to add. For months I have endeavored to formulate plans which could meet the needs of such a museum as this, and after presenting to the Trustees three successive sets of plans, the second and third pared down from the preceding until the attenuation can be carried no farther and leave vitality enough in the structure to be of real use, still the funds available do not admit, in the opinion of a majority of the Trustees, of beginning to build. I do not despair, for the architect who planned the original structure of this Museum gave only a closet under the stairway (which now hardly suffices for the janitors to store their implements) for all the Museum work. Then came the cellar under Polynesian Hall, and at last the temporary wooden buildings, several hundred feet away for the Press, Taxidermy, Photography and everything else. So in the process of evolution we may attain even greater helps in our work.

With no suitable workrooms, still less any adequate storerooms at present, a condition of things which is I believe admitted by all the Trustees, the workers in the Museum cannot justly be blamed if they do not take active measures to increase the collections when we have nowhere to prepare, exhibit or store them. When they have not sufficient room apart from the public exhibition halls to unpack valuable collections already in possession; when they see valuable specimens fade away to worthlessness in the exhibition cases because they have no other place safe from insects in which to store them.

And this brings me to the consideration of one of the most important objects for which this Museum was founded,—the *preservation* of the objects collected within its walls. We have taken several important steps in that direction: a durable and essentially fire-proof building; cases as insect- and dust-proof as they can be made; a free use of preservatives, poisons and insecticides. All this is well but not enough. Certain rare specimens should no longer be exposed to the intensely actinic light of this climate but be withdrawn from public exhibition and consequent exposure, and stored for study by another generation of scientists instead of being sacrificed to the idle curiosity or unheeding gaze of the average visitor.

I had intended to place before you an analysis of what has been published by eminent museologists,—Drs. Flower, Goode, True and others on the side of work and store rooms, but our situation in the midst of the Pacific is so peculiar that even the generous allotment of work and store space by all these masters as distinct from the public exhibition halls of a museum, will hardly meet the wants of this Museum in a tropical climate, where work rooms must not be cramped and heated, and storage must be well aired and accessible. Our conditions are greatly variant from those of most large museums in cold climates where they have need of artificial heat during a portion of the year, and the winter's cold checks the activities of insect pests, while here pests of that nature are perennial and far exceeding in variety and abundance. In spite of the best of cases, collections of birds, insects, plants, must be frequently inspected, and all museum workers know that this inspection if properly done, needs room, it cannot be done in a public gallery in the presence of careless or inquisitive visitors.

I have harped so often on this string that I refrain from wearying you farther with what seems to all of us engaged in museum work the most important, and sooner or later the surely fatal defect of the Bishop Museum. I will only say that while this monument to Mrs. Bishop should be a permanent one there is little permanency about it except in the stone walls and stone implements, and to a less extent some of the wooden implements and the shells, corals and volcanic specimens. I should be recreant to my duty as Director of this Museum if I did not utter this warning. We have made too much of present exhibition for vain public gratification and have provided too little for the permanency of the treasures amassed within the Museum walls, which when perished can never be replaced.

I will not leave this subject with the impression that I do not believe a museum such as this has a part to fulfil toward the public in exhibiting to a wise extent, that is so far as by so doing it can convey instruction and even pleasure to visitors, but there is far greater good to be done to far greater numbers by such collections as ours in a very different way. They must be studied, here on the spot, by competent men, and there must be conveniences for such work. The results thus obtained will reach farther and last longer than the praises (often unmixed with knowledge) which fall from the transient visitor, however complimentary, and however pleasing to one's self-love.

Hawaiian Hall is large enough, if duplicates could be stored elsewhere, to exhibit all that any visitor of a few hours need know of Hawaiian life, human, animal, vegetable or mineral, and Polynesian Hall will do very well under the same conditions if we could separate and place in another hall somewhat larger the Papuan portion of our collection. These two halls would amply accommodate all the material we ought to exhibit or can afford to exhibit with the present income of the Museum funds. Unless we have money to buy certain private collections, we cannot get things from the Pacific desirable for exhibition in the department of Polynesian Ethnology simply because they do not exist outside collections made many years ago, and any proposed ethnological exploration of the Pacific islands must begin by securing these private collections which contain far more material for exhibition purposes than can now be collected on the islands.

I turn to the things in hand,—pleasanter matter for the earnest man than the dream of what might be if we were all wise and had command of sufficient money. We have by no means been stranded but have gone slowly on with some things to cheer us as may be seen in the appended lists of accessions. We have secured the services of a thoroughly competent entomologist in the person of Mr. Otto H. Swezey, and for the first time the collections of Mr. R. C. L. Perkins, for which the Museum contributed one-third of the cost of collecting and more than one-half the expense of publication, are being utilized and arranged for inspection by students. Under the unfortunate arrangement for the distribution of the remarkable collection of Mr. Perkins, the portion coming to this Museum of course could not include any species of which there were less than three specimens collected and so has none of the very rare ones, yet it is a sufficiently important collection to be worth all the care that we can bestow upon it.

We have also been fortunate in securing the services of Miss E. Schupp, formerly Secretary in the Seckenberger Museum at Frankfurt a/M to take charge of our well-selected and growing library. Mr. J. F. G. Stokes has not only attended to his work as Curator of Ethnology, but has been occupied with necessary work in other departments now without a head, and has done extensive work on the plans of the ancient heiau made by his own careful surveys on Hawaii.

Dr. Cooke has continued his good work on the Hawaiian land shells and has been during the year appointed Curator of Pulmonata. As he has been able to establish his laboratory in his home he has suffered less than the other workers from insufficient accommodations. He has prepared an account of the *Hawaiian Helicinæ* which is now in the hands of the Publication Committee.

Mr. J. W. Thompson has continued his admirable casting and painting of the Fishes and Fruits until the results are most valuable and interesting, and the extent of his work will be judged by the appended list of casts.

In the Library the binding of more than five hundred volumes has been completed, adding greatly to the convenience of the Museum workers, and the increase has been satisfactory as will be seen by the list of accessions. We have also added somewhat to our exchange list. An additional case has been procured for the constantly increasing cards of the Concilium Bibliographicum, a collection very valuable in this place remote from large libraries.

The Museum Press has issued only the Annual Report for 1906, but has been occupied with printing the third part of Volume II of the Memoirs, "The Ancient Hawaiian House", by the Director. It is hoped that this may be completed during the current year. Other papers have been prepared but were not ready for press during the past year.

The Deverill collection of Hawaiian ethnology which has been stored in the Museum for some time, has been finally purchased for the Museum by the C. R. Bishop Trust and will soon be incorporated with the general collection. If Mr. Deverill could have lived long enough to write his notes on the articles comprising his collection its value would have been greatly enhanced, for he was a careful observer and his knowledge of native ways was uncommonly extensive. It is intended to offer notes on some of the rarer objects in the Museum publications.

Of the very remarkable collection of Hawaiian carvings and other antiquities described in the second part of the second volume of the Museum Memoirs, two-thirds have come into our possession, that belonging to Mr. Haenisch by gift, the other by purchase, and the remaining portion is promised to the Museum and will eventually be placed in its cases. For many reasons this is one of the most interesting and valuable collections we have lately acquired, and the interest it has excited among archæologists and ethnologists abroad is shown by the call for the published account referred to.

The table of attendance of visitors shows a decrease in the total from last year of 470. The decrease of tourists continues although little more than half that of last year. The Museum has been open five more than half the week-days of the year. The average daily attendance has, for the first time since 1902, fallen below 100. The summary of attendance for 1906 and 1907 is here given and the full table follows. It may be explained that the class "others" includes Koreans, Philippinos, Hindus and Negroes.

	Whites.	Hawaiians.	Portuguese.	Chinese.	Japanese.	Others.	Totals.
1906....................	4659	1499	584	2101	2265	386	11,494
1907....................	4126	1621	548	1834	2535	360	11,024
Change from last year:	—533	+122	—36	—267	+270	—26	—470

TABLE OF ATTENDANCE.

1907.	Whites.	Hawaiians.	Portuguese.	Chinese.	Japanese.	Others.	Open on		Visitors on closed days.	Average Attendance.		Total Visitors.
							Public days.	Other days.		Public days.	Other days.	
January	261	51	22	76	142	17	9	4	20	61	5	569
February	317	120	17	611	366	21	8	6	36	177	6	1452
March	645	145	48	184	201	13	11	5	28	110	8	1236
April	310	61	58	130	156	7	8	3	33	86	11	722
May	402	173	47	160	266	21	11	4	54	92	13	1069
June	307	122	42	98	415	59	10	2	13	103	6	1043
July	321	62	52	60	240	41	9	7	90	77	13	779
August	288	86	67	115	171	26	10	5	41	71	8	753
September	336	135	45	97	121	44	9	4	14	85	4	778
October	292	183	57	83	116	18	8	3	20	91	7	749
November	101	338	79	128	200	37	10	2	3	118	1.5	1183
December	246	145	14	92	141	53	8	3	12	87	4	691
Totals	4126	1621	548	1834	2535	360	111	48	364	96	8	11,024

List of Accessions.

DEPARTMENT OF ETHNOLOGY.

Gifts.

9066 Phallic female stone. Molokai. Given by Mr. Bruce Cartwright, Jr.
9067, 9068 Two Aumakua. Hawaii. Given by Mr. F. A. Haenisch.
9069 Ipu aina. Hawaii. Id.
9070 Feather cape fragment. Hawaii. Id.
9071 Wooden funnel. Hawaii. Id.
9100–03 Fishing stones. Molokai. Given by Mr. James Munro.
9104–06 Ulumaika. Molokai. Id.
9107–10 Adzes. Molokai. Id.
9111–12 Skulls. Molokai. Id.
9114–20, 9161, 9162 Poi pounders. Hawaii. Given by Mr. C. V. E. Dove.
9641–46 Ulumaika. Hawaii. Id.
9647 Ulumaika, or bath rubber. Hawaii. Id.
9648 Ulumaika, or polishing stone. Hawaii. Id.
9649 Polishing stone. Hawaii. Id.
9650 Sinker. Hawaii. Id.
9651 Adze, broken. Hawaii. Id.
9652 Poi pounder. Molokai. Given by Mr. Levi Mahiai.
9653 "Fe", stone money. Yap, Caroline Ids. Given by Hon. H. Nanpei.

Purchased.

8719 Small kuula. Hawaiian Ids.
9072 Wooden figure, Hawaii.
9073 Ipu aina. Hawaii.
9074 Hair helmet. Hawaii.
9075 Fragment of pottery. Hawaii.
9076 Thirty boars' tusks. Hawaii.

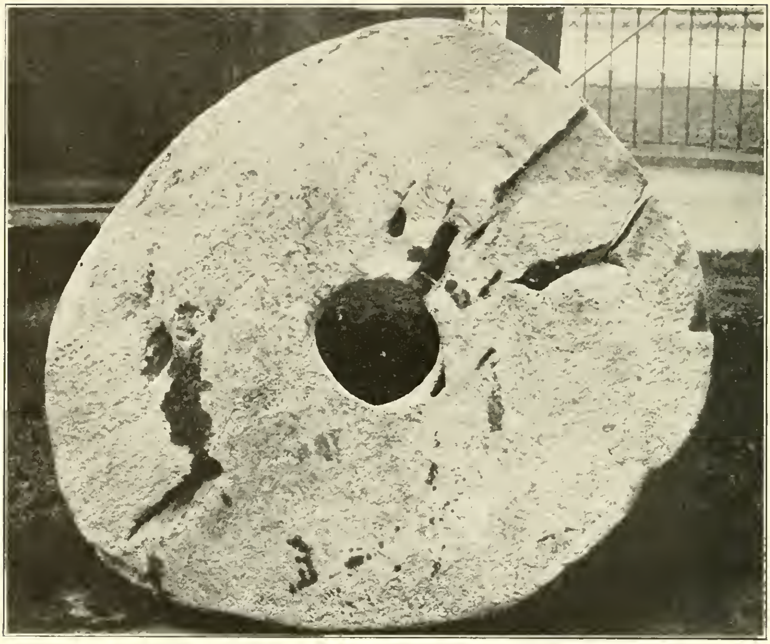

FIG. 1. STONE "FE" FROM YAP (NO. 9653).

9163 Wooden needle. Hawaii.
9164 Oloná scraper. Hawaii.
9165–70 Adzes. Hawaii.
9171 Polishing stone. Hawaii.
9172–76 Ulumaika. Hawaii.
9177, 9178 Sinkers. Hawaii.
9179 Ivory button. Hawaii.
9180 Pohaku eho. Hawaii.
9181, 9182 Sling stones. Hawaii.
9183 Stone lamp. Hawaii.
9184 Dye cup. Hawaii.
9185 Hawaiian pillow. Hawaiian Ids.
9186 Lei palaoa. Hawaiian Ids.
9187 Oloná cord and fibre. Hawaiian Ids.
9188–90 Fish hooks. Hawaiian Ids.
9191 Spear. Oahu.

Collected.

9113 Skull. Molokai. By Mr. W. A. Bryan.

DEPARTMENT OF ORNITHOLOGY.

Gift.

4711 Nest of Chlorodrepanis virens (Gmel.). Hawaii. Given by Mr. G. P. Wilder.

Collected by Mr. W. A. Bryan.

4541, 4542 Gallinula sandvicensis Streets. Oahu.
4543–49 Fulica alai Peale. Oahu.
4550–52 Gallinula sandvicensis Streets. Oahu.
4553 Actodromas acuminata (Horsf.). Molokai.
4554 Gallinago delicata (Horsf.). Molokai.
4555–66 Himatione sanguinea (Gmel.). Molokai.
4567–80 Chlorodrepanis kalaana (Wilson). Molokai.
4581–4604 Oreomystis flammea (Wilson). Molokai.
4605–18 Psittirostra psittacea (Gmel.). Molokai.
4619–26 Vestiaria coccinea Forster. Molokai.
4627–43 Phæornis rutha Bryan. Molokai.
4644 Carpodacus m. obscurus McCall. Molokai.

4645–47 Himatione sanguinea (Gmel.). Molokai.
4648 Phæornis rutha Bryan. Molokai.
4649, 4650 Vestiaria coccinea Forster. Molokai.
4651–53 Chlorodrepanis kalaana (Wilson). Molokai.
4654–57 Oreomystis flammea (Wilson). Molokai.
4658–61 Asio accipitrinus sandvicensis (Blox.). Molokai.
4662–81 Æstrelata phæopygia Salvida. Molokai.
4682–89 Himatione sanguinea (Gmel.). Molokai. Nest.
4690–95 Oreomystis flammea (Wilson). Molokai. Nest.
4696–98 Chlorodrepanis kalaana (Wilson). Molokai. Nest.
4699–4701 Vestiaria coccinea Forster. Molokai. Nest.
4702–08 Nests, unknown. Molokai.
4709 Carpodacus m. obscurus McCall. Molokai. Nest.
4710 Phæornis rutha Bryan. Molokai.
4711 Chlorodrepanis virens (Gmel.). Molokai.
4712–14 Drepanorhamphus funereus (Newton). Molokai.

DEPARTMENT OF CONCHOLOGY.

Collected by Dr. C. M. Cooke, Jr., and Acquired by Gift.

925 Lot of Pulmonata, comprising 10,000 to 15,000 specimens, from the whole group, excepting Kahoolawe.

Gifts from the following gentlemen have been acknowledged: Messrs. D. Thaanum, D. D. Baldwin, A. F. Judd, R. A. Cooke, W. F. Frear, A. F. Knudsen, C. Davis, H. Hitchcock, J. F. G. Stokes, H. M. von Holt, H. Podmore and —— Fraser.

DEPARTMENTS OF MODELING AND ICHTHYOLOGY.

Eighty casts of fish and twenty-four casts of fruits have been made, while the bodies of the fish cast have been preserved. A list of the entire collection of casts is given below.

MARINE ZOOLOGY.

A collection of deep sea corals received from the U. S. National Museum in exchange.

ADDITIONS TO THE LIBRARY.

Accessions denoted by an asterisk were acquired by exchange.

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*Anthropological Institute of Great Britain and Ireland.—Journal, vol. xxxvi.

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*Anthropologie de Paris, Revue de l'École d'.—Seizième année, 10–12. Septième année, 1–2.

*Anthropologie de Paris, Société d'.—Tome xvii, fasc. 2–6; tome xviii, fasc. 1.

*Archiv für Ethnographie.—Band xvi. Leiden, 1904.

*Archivio por l'Anthropologia.—Vol. xxxvii, pt. 2.

*Asiatic Society of Bengal.—Memoirs, vol, i, pts. 10–19, and Supplement.—Journal and Proceedings, vol. ii, nos. 4–9.—Index to vol. i.

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*Board of Commissioners of Agriculture and Forestry (Hawaiian). Second Report.—Bull. 2, Division of Entomology.

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*Boston Society of Natural History.—Proceedings, vol. xxxiii, pts. 5–9.

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*Brooklyn Institute of Arts and Sciences.—Science Bulletin, vol. i., pts. 4–10.

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*Canterbury (N. Z.) Museum Records, vol. i, pt. 1.

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*Carnegie Institution of Washington.—Year Book, 1906.—Publications, 47, 48, 54, 55, 56, 58, 59 (pt. 1), 60–72, 76–79, 81, 84, 85, 91.

*Carnegie Museum.—Memoirs, vol. ii, pt. 10; vol. iii, pt. 1.—Annals, vol. iv, pts. 1–2.—Annual Report, 1907.

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Cheeseman, Thomas F.—Catalogue of the Plants of New Zealand. Wellington, 1906.

Chili, Ministerio de Industria.—La Caza de la Ballena en la Isla Santa Maria.—El Karri o Eucalyptus diversicolor ila replantacion de los Cerros aridos del Paes.—I Como defendernos contra los Creces de los Rios?—La Reproducion Forestale. Los Servicios de Aguas i Bosques.—El Cultivo del Olivo en Cerros secos.

*Cincinnati Museum Association.—Twenty-sixth Annual Report, 1907.

*Connecticut Academy of Arts and Sciences.—Transactions, vol. xii, vol. xiii, pp. 1–297.

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Dittmar, Wilhelm.—Te Tohunga.—Alte Sagen aus Maoriland.

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*Field Museum.—Publications: Botanical, vol. ii, 4, 5; Geological, vol. iii, 4, 5; Zoological, vol. vi, vii (1–4), vol. viii.—Report series, vol. iii, 1.

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Froggatt, W. W.—Australian Insects. Sydney, 1907.

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*Hawaiian Sugar Planters Association.—Report and Year Book, 1906.—Division of Agriculture and Chemistry: Bulletin 20, Circulars 2–5.—Division of Entomology: Bulletins, 3–5, Circulars 2–8.—Division of Pathology and Physiology: Bulletins 4–5, Circulars 5–6.

Hawaiian Tariff. Given by Dr. Wm. T. Brigham.

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*Marine Biological Association of the United Kingdom.—Journal, vol. vii, 5; viii, 1.

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Mayer, Henri.—Le Monde Polynesien.

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*Missouri Botanical Garden.—Eighteenth Annual Report, 1907.

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Morgan, Lewis H.—Ancient Society. New York, 1878.

*Museo Nacional de Buenos Aires.—Anales, serie iii, tomo vi–viii.

*Museo Nacional de Rio de Janeiro.—Archivios, vols. xi–xii.

*Museum of Comparative Zoology.—Annual Report of the Curator of the Museum, 1905–06, 1906–07.—Bulletin, xliii, 5; l, 8, 9; li, 1–6.—Memoirs, xxxv, 2.

*Museum of Fine Arts, Boston.—Annual Report, 1906.—Bulletins.

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*New Zealand Institute.—Proceedings, vol. xxxix.

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*Peabody Museum of American Archæology.—Fortieth Annual Report, 1906–07.—Papers, iv, 2.

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Auckland Institute. Auckland, N. Z.
Australian Museum. Sydney.
Boston Public Library.
Boston Society of Natural History.
Brooklyn Institute of Fine Arts and Sciences, Museum of the.
California Academy of Sciences. San Francisco.
Canterbury Museum. Christchurch, N. Z.
Carnegie Institution. Washington, D. C.
Carnegie Museum. Pittsburg, Penn.
Columbia University Library. New York.
Connecticut Academy of Arts and Sciences. New Haven.
Dartmouth College. Hanover, New Hampshire.
École d'Anthropologie de Paris.
Field Museum. Chicago.
Free Museum of Science and Art. Philadelphia.
Geological Survey of New South Wales. Sydney.
Gordon Technical College. Geelong, Australia.
Harvard University Library. Cambridge, Mass.
Hawaiian Evangelical Association. Honolulu.
Hawaiian Historical Society. Honolulu.
Hilo Public Library. Hawaii.
Honolulu Library Association. Honolulu.
Indian Museum. Calcutta, India.
Jardin Botanique de Buitenzorg. Java.
Johns Hopkins University. Baltimore.
K. K. Naturhistorische Hofmuseum. Wien.
Kongl. Vitterhets Historie och Antiqvitets Akademien. Stockholm.
Königliche Ethnographische Museum. München.
Königliche Museum für Völkerkunde. Berlin.
Königliche Zoologische und Anthropologisch-Ethnographische Museum. Dresden.
Leland Stanford Junior University. California.
Library of Congress. Washington.
Linnean Society of London.
Linnean Society of New South Wales. Sydney.
Madras Government Museum. Madras, India.
Marine Biological Association of the United Kingdom. Plymouth.
Maryland Geological Survey. Baltimore.
Mexico Instituto Geologico.
Missouri Botanical Garden. St. Louis.
Museo Civico di Storia Naturale di Genoa.
Museo Nacional de Buenos Aires.
Museu Goeldi. Para, Brazil.
Museu Paulista. Sâo Paulo, Brazil.
Museum of Comparative Zoology. Cambridge, Mass.
Museum of Fine Arts. Boston.

Museum für Natur-, Völker- und Handelskunde. Bremen.
Museum National Hongrois. Budapest.
New South Wales Department of Fisheries.
New Zealand Institute. Wellington.
Oahu College. Honolulu.
Peabody Academy of Science. Salem, Mass.
Peabody Museum. Cambridge, Mass.
Philadelphia Commercial Museums.
Philippine Islands, Bureau of Science.
Philippine Islands, Ethnological Survey.
Polynesian Society. Wellington, N. Z.
Public Museum. Wanganui, N. Z.
Real Academia de Ciencias y Artes de Barcelona.
Reale Accademia dei Lincei. Roma.
Rijks Ethnographische Museum. Leiden.
's Rijks Museum van Naturvlijke Historie. Leiden.
Royal Anthropological Institute. London.
Royal Geographical Society. London.
Royal Irish Academy, Dublin.
Royal Society of Edinburgh.
Royal Society of New South Wales. Sydney.
Royal Society of Queensland. Brisbane.
Royal Society of South Australia. Adelaide.
Royal Society of Victoria. Melbourne.
Smithsonian Institution. Washington.
" " Bureau of American Ethnology. Washington.
" " U. S. National Museum. Washington.
Società Italiana di Antropologia e Etnologia. Firenze.
Société d'Anthropologie. Paris.
Société Royale des Antiquaires du Nord. Copenhague.
Société Royale Malacologique de Belgique. Bruxelles.
South African Museum. Capetown.
South Australian Museum. Adelaide.
Stadischen Museum für Völkerkunde zu Leipzig.
Tufts College. Mass.
Universiteit van Amsterdam.
University of California. Berkeley, Cal.
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University of Pennsylvania. Philadelphia.
U. S. Experiment Station. Honolulu.
U. S. Geological Survey. Washington, D. C.
Wagner Free Institute of Science. Philadelphia.
Yale University Library. New Haven.

A List of Casts of Hawaiian Fishes

MADE BY JOHN W. THOMPSON OF THE MUSEUM STAFF.

In all cases where possible the original of the cast has been preserved. A number of casts of fish not yet determined with certainty should be added to this list in summing up the number. The figures after the names represent in inches the length of the cast from snout to tip of tail, and the fish are from Honolulu unless otherwise noted.

Sphyrna zygæna (Linn.). Hammer-headed shark. Mano kihikihi. 33.5.
Casts of two young sharks, species not determined. 23, 35.
Stoasodon narinari (Euphrasen). Spotted Sting-ray. Hihimanu. Body only. 20.5.
Albula vulpes (Linn.). Bonefish. Oio. 24.
Chanos chanos (Forskal). Milkfish. Puawa. 28.5.
Trachinocephalus myops (Forster). Welea. 10.
Saurida gracilis (Quoy & Gaim.). Ulae. 10.5.
Synodus varius Lacépède. Ulae. 12.
Congrellus (sp.). Conger Eel. Puhi. 62.
Microdonophis fowleri Jordan & Evermann. 26.
Gymnothorax laysanus (Steindachner).
Echidna zebra (Shaw). Puhi. 45.
Sphagebranchus flavicaudus Snyder. 16.
Eleven undetermined species, mainly Gymnothorax.
Aulostomus valentini (Bleeker), three distinct colors. Nunu. 28.5, 22.7, 14.7.
Tylosurus giganteus (Schlegel). Ahaaha. 32.
Athlennes hians (Cuv. & Val.), (2). 41, 44.5.
Euleptorhamphus longirostris (Cuvier). Iheihe. 18.7.

Exocœtus volitans Linn.; also young. Flying-fish. Malolo. 12.7, 6.7.
Mugil cephalus Linn. Mullet. Amaama. 20.
Sphyræna snodgrassi Jenkins. 32.7.
" helleri Jenkins. Kawaleá. 17.
Polydactylus sexfilis (Cuv. & Val.). Moi. 20.
Holotrachys lima (Cuv. & Val.). 5.
Ostichthys pillwaxii (Steindachner), (3). 10, 10.4, 10.5.
Myripristis chryseres Jordan & Evermann. Pauu. 8.5.
Flammeo sammara (Forskal). 8.7.
" scythrops Jordan & Evermann. 8.5.
Holocentrus spinifer (Forskal). 18.5.
" ensifer Jordan & Evermann. 12.7.
Xiphias gladius Linn. (cast of head only). A'u.
Scomber japonicus Houttuyn.
Auxis thazard (Lacépède). Frigate Mackerel.
Gymnosarda pelamis (Linn.).
" alletterata (Rafinesque). Bonito. Kawakawa. 16.
Germo germo Lacépède. Albacore. Ahi. 56.
Ruvettus pretiosus Cocco (2). Walu. 44.
Promethichthys prometheus (Cuv. & Val.). 13.4.
Lemnisoma thyrsitoides Lesson. Hauliuli puhi. 37.7.
Scomberoides toloo parah (Rüppell). Lae. 24.
Seriola (sp.). 28.
Decapterus pinnulatus (Eydoux & Souleyet). Opelu. 18.
Carangus ignobilis (Forskal). Pauu'u. 36.5.
" elacate Jordan & Evermann (2). 32.
" melampygus (Cuv. & Val.). Omilu. 15.
" rhabdotus Jenkins.
" helvolus (Forster).
Caranx speciosus (Forskal). Paopao. 21.
Carangoides ferdau (Forskal).
" gymnostethoides Bleeker. 19.
Alectis ciliaris (Bloch). Ulua kihikihi. 4.5.
Collybus drachme Snyder. 7.7.
Coryphæna hippurus Linn. Dolphin. Mahihi. 61.
Kuhlia (sp.).
Amia maculifera (Garrett). 3.7

Amia menesema (Jenkins). 5.4.
Epinephelus quernus Seale (2). 11, 5.4.
Odontanthias fuscipinnis (Jenkins). 8.
Priacanthus alalaua Jordan & Evermann. Alalaua. 7.4.
" cruentatus Lacépède. 16.5
" meeki Jenkins (2). 13.7, 19.2.
Rooseveltia brighami (Seale). Ukikiki. 16.5.
Aphareus flavivultus Jenkins (2). 19.5.
Aprion virescens Cuv. & Val. Uku.
Etelis marshi (Jenkins), (2). Ulaula. 21.5, 15.
" evurus Jordan & Evermann (2). 38, 38.5.
Monotaxis grandoculis (Forskal). Mamamu. 9.
Mulloides auriflamma (Forskal). Weke ula. 14.
Pseudupeneus chryserydros (Lacépède). Moano kea. 10.
" multifasciatus (Quoy & Gaim.). Moano. 8.
" chrysonemus Jordan & Evermann. 7.2.
" porphyreus Jenkins. Kumu. 15.7.
Upeneus arge Jordan & Evermann. Weke. 15.5.
Dascyllus albisella Gill (2). 3.7, 4.
Chromis ovalis (Steindachner). 7.2.
Pomacentrus jenkinsi Jordan & Evermann. 3.5.
Abudefduf abdominalis (Quoy & Gaim.). Maomao. 7.7.
" sordidus (Forskal), (2). Ku pipi. 5.
Malacanthus parvipinnis Vaillant & Sauvage. Maká'a. 11.
Lepidaplois albotæniatus (Cuv. & Val.). A'awa. 5.2.
" strophodes Jordan & Evermann. 4.5.
Verreo oxycephalus (Bleeker). 25.5.
Halichœres ornatissimus (Garrett). Ohua paawela. 5.2.
Gomphosus varius Lacépède. Aki lolo. 5.
" sandwichensis Günther. Hinalea iiwi. 6.5.
" tricolor Quoy & Gaim. Hinalea iiwi. 9.
Anampses evermanni Jenkins. Opule lauli. 11.5.
Thalassoma purpureum (Forskal). 14.7.
" fuscum (Lacépède. Awela. 10.5.
" duperrey (Quoy & Gaim.). 9.
" aneitense (Günther). 5.5.
Julis pulcherrima (Günther). Hinalea loló. 8.7.

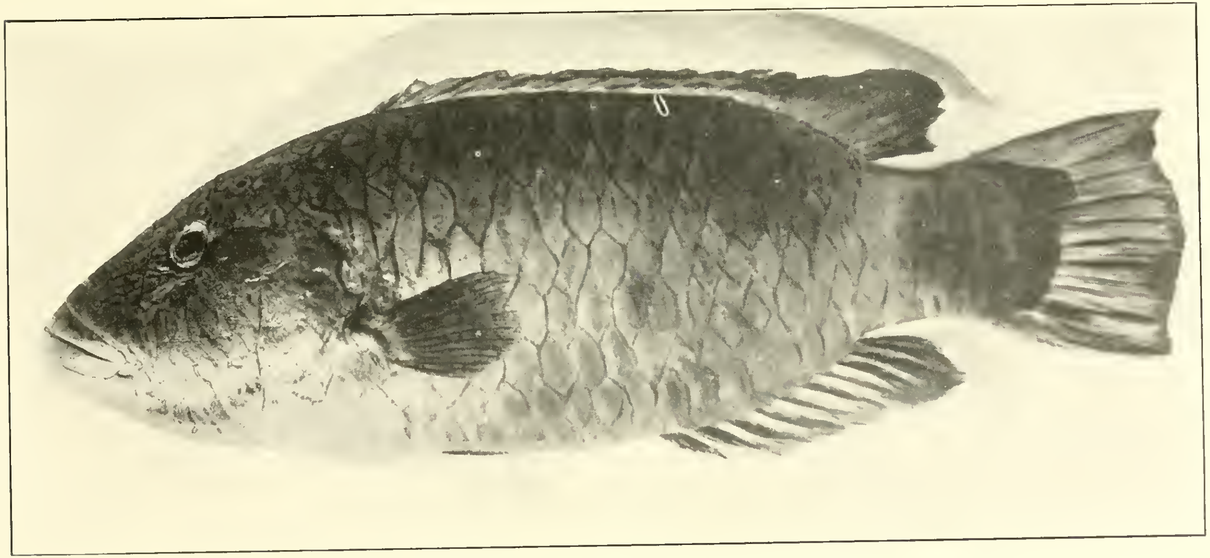


FIG. 1. CAST OF CHEILINUS HEXAGONATUS GUNTHER. 18.2 IN.

Julis lepomis (Jenkins). 17.2.
" eydouxii Cuv. & Val. 14.2.
Coris ballieui Vaillant & Sauvage. 9.2.
" venusta Vaillant & Sauvage. 6.2.
Cheilio inermis (Forskal), (4). Kupoupou. 7, 11.5, 14, 16.
Pseudocheilinus octotænia Jenkins. Aleihi lakea. 18.7.
Cheilinus hexagonatus Günther (2). Poou. 12.5, 18.2. See Fig. 1.
Novaculichthys woodi Jenkins. 5.7.
" tæniourus (Lacépède). 10.5.
" kallosoma (Bleeker). 4.
Cymolutes lecluse (Quoy & Gaim.). 6.7.
Iniistius pavoninus (Cuv. & Val.). 4.7.
" niger (Steindachner). 5.7.
Xyrichthys niveilatus Jordan & Evermann. 10.5.
Calotomus irradians Jenkins. 19.5.
Three undetermined species.
Scaridea zonarcha Jenkins (2). 9.2, 11.7.
Callyodon perspicillatus (Steindachner). Uhu uli uli. 18.7.
" jenkinsi (Jordan & Evermann). 14.
" lauia (Jordan & Evermann). Lauia. 9.7.
Two undetermined species.
Forcipiger longirostris (Broussonet). 7.
Chætodon setifer Bloch. 6.7.
" lunula (Lacépède), (2). Kikakapu. 2.7, 5.7.
" unimaculatus Bloch (2). Kikakapu. 4, 3.5.
" punctatofasciatus Cuv. & Val. 3.6.
" miliaris Quoy & Gaim. 5.2.
" trifasciatus Mungo Park. 5.
" ornatissimus Solander. 4.7.
" quadrimaculatus Gray (2). 5.4, 5.
" fremblii Bennett. 5.5.
" ephippium (Cuv. & Val.). 6.
Microcanthus strigatus (Cuv. & Val.). 5.
Heniochus acuminatus (Linn.). 6.2.
Holocanthus arcuatus Gray. 7.
Zanclus canescens (Linn.). Kihikihi. 6.2.
" ruthiæ Bryan. 2.7.

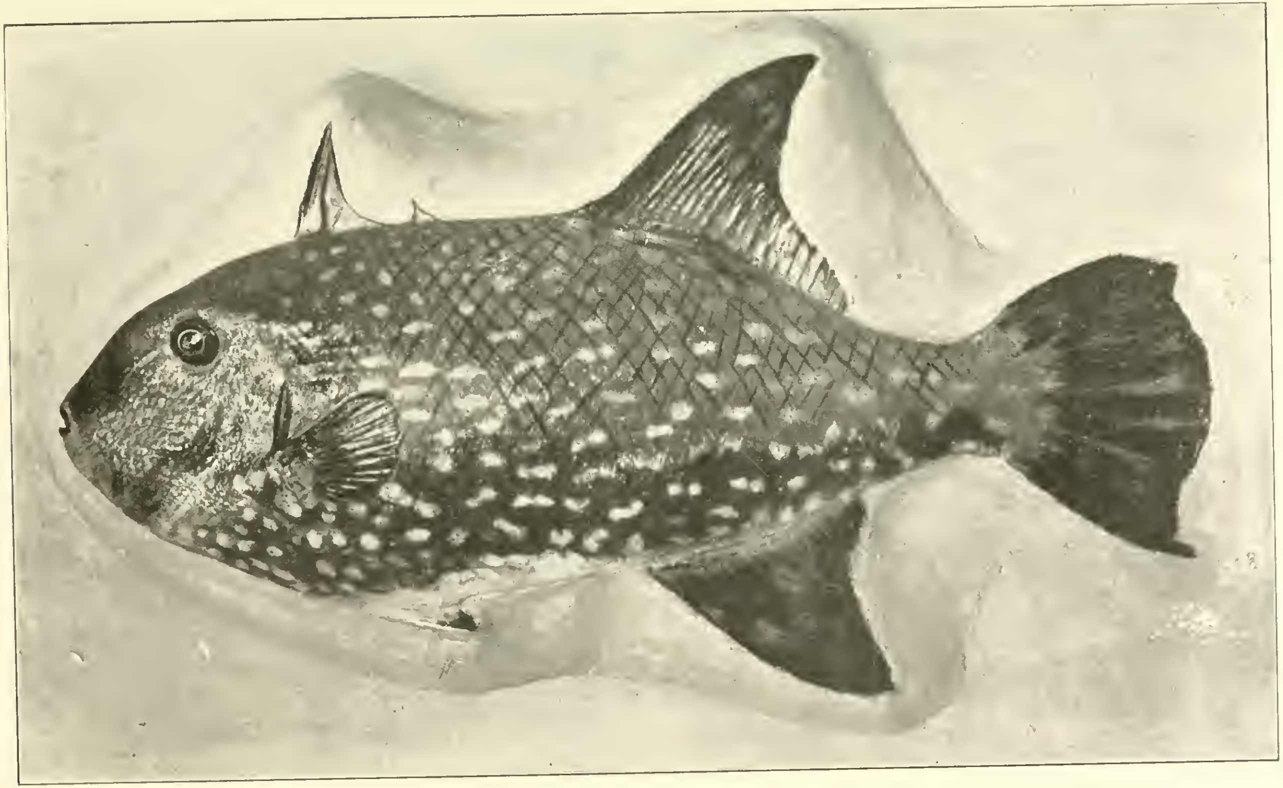


FIG. 2. CAST OF CANTHIDERMIS MACULATUS BLEEKER. 11.5 IN.

Hepatus achilles (Shaw). Pa kui kui. 7.
" dussumieri (Cuv. & Val.). 17.
" xanthopterus (Cuv. & Val.). Walu. 23.
" guttatus (Bloch & Schneider). 10.5.
" atramentatus (Jordan & Evermann). Maiko. 7.
" sandvicensis (Streets). 8.
Zebrasoma veliferum (Bloch). 7.
" flavescens (Bennett). Laipala. 2.3.
Acanthurus unicornis (Forskal), (2). Kala. 25, 8.
" brevirostris (Cuv. & Val.), 28.5 to tip of horn, and young. 8.5, 30.5.
Callicanthus lituratus (Forster). 13.
Balistes nycteris (Jordan & Evermann). 5.7.
" vidua Solander (2). Humuhumu uli. 4.5, 10.4.
" bursa Lacépède. Humuhumu lei. 7.5.
Balistapus rectangulus (Bloch & Schneider). 8.4.
" aculeatus (Linn.), (2). 4.6, 10.7.
Canthidermis maculatus Bleeker. 11.5. See Fig. 1.
Melichthys radula (Solander). Humuhumu eleele. 11.
Cantherines sandwichiensis (Quoy & Gaim.). 12.
Stephanolepis spilosomus (Lay & Bennett), (2). Oili uwiwi. 2.5, 5.6.
Osbeckia scripta (Osbeck). 25.2.
Tetraodon hispidus Linn. (3). Keke. 4, 10.5, 13.
Two species undetermined.
Canthigaster cinctus (Solander). 4.
Ranzania makua Jenkins. Makua. 23.
Ostracion sebæ Bleeker. Moa. 5.4.
Lactoria schlemmeri Jordan & Snyder. 11.5.
Cheilodactylus vittatus Garret (2). Kikakapu. 9.5, 12.5.
Paracirrhites forsteri (Bloch & Schneider). Piliko'a. 7.
" arcatus, (Cuv. & Val.). Piliko'a. 4.7.
Cirrhitus marmoratus (Lacépède). Oopukai. 10.
Sebastapistes corallicola Jenkins. 4.5.
One undetermined species. 3.
Pterois sphex Jordan & Evermann. 6.
Scorpænopsis cacopsis Jenkins. 14
" gibbosa (Bloch & Schneider). Omakaha. 17.5.

Iracundus signifer Jordan & Evermann. 4.2.
Peristedion engyceros (Günther). 11.5. Lahaina.
Cephalacanthus orientalis (Cuv. & Val.). Lolo-oau. 10.5.
Osurus schauinslandii (Steindachner). 4.6.
Eleotris sandwicensis Vail. & Sauv.). Oopu. 4.6.
Brotula marginalis Jenkins. 11.
Platophrys pantherinus (Rüppel). 7.
One species not determined. 4.6.
Antennarius leprosus (Eydoux & Souleyet). 4.2.

Two hundred and fifty-three casts in all.

[120]

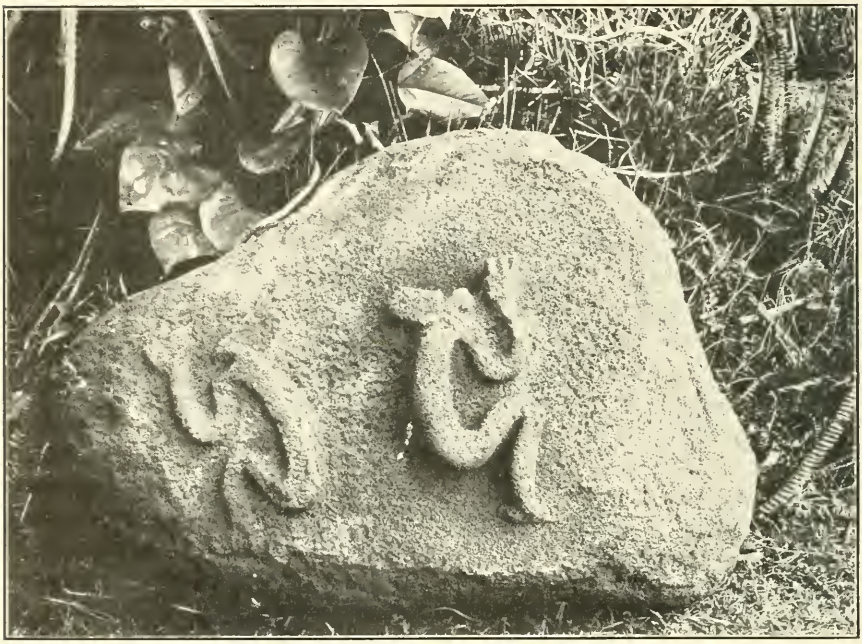
Stone Sculpturings in Relief from the Hawaiian Islands.

By John F. G. Stokes.

A stone bearing a remarkable pair of petroglyphs was, a few years ago, ploughed up at a place called Puu o Ma'o on the cliff forming the eastern side of Moanalua valley, near Honolulu, and after being taken to the house of the owner, Hon. S. M. Damon, was photographed with that gentleman's kind permission.

The stone is an irregularly shaped piece of rather finely cellular basalt, measuring 31 inches long, 21 wide and 17.5 thick, the face of which has been carefully worn down by hammering with a stone or dull metal instrument, leaving the representations of two human figures in relief (fig. 1, *b* and *a*) the outer surface of which formed part of the original surface of the stone. The workmanship in the two figures differs in regard to care of execution, which is probably due to the fact that fig. 1, *a*, was nearer completion, and, being in higher relief than the other, this would allow greater scope to the dull tools applied. The area enclosed by the bodies, arms and thighs of both figures and the arm and chin of fig. 1, *a*, is higher than the surrounding plane. The sculptured surface might thus be likened to a zincotype well routed out. This would seem to be due to the deficiencies of the tools used.

The height of relief of fig. 1, *a*, varies somewhat, being at finger tip 1.1 inches, between chin and hand .8, chin 1.4, back 1.8, buttocks 2, foot .1 to .3, knee 1.3, between knee and elbow .6, belly .8. The measurement from head to foot is 11.8 inches. In this figure a piece has been recently broken out of the arm, leaving a scar running from the finger to the elbow; but it is still perfectly clear that the hand had only three fingers. It is also evident that an attempt was made to represent the juncture of the wrist and hand by a narrow cross ridge. A comparison with the conventionalized hands of the Maori carved figures might not be out of place. The portion representing the face has been symmetrically chipped away on both sides leaving a blunt ridge running from the forehead to the upper lip without any distinctive mark to indicate the nose. At the angle of the cheek a piece has been gouged out to represent the eye. The chin has not been worked down and stands higher in relief than the upper lip. The mouth has been chipped at an angle. The head is joined to the shoulder directly above the armpit by a narrow flattened ridge, back of which is a shallow groove. The portion from the parietal region to the middle of the back has not been finished, as is apparent from the slope of the stone and the rough pits remaining (figs. 1 and 2). The shoulder is in higher relief than the head. The back as far as finished is well rounded. The buttocks are curved well under the figure. There was hardly enough material to carve the whole foot in relief, but a very prominent heel was left. The length of the foot traceable is 2.3 inches. The knee is represented by a straight cut 1 inch long. The edge of the belly was finished at a right angle,



b FIG. 1. *a*

probably by rubbing. The surface of this figure is as smooth as the rough lava would permit, and undoubtedly this effect has been produced by the same process.

Figure 1, *b*, measures 10.2 inches from crown to toe; the height in relief at back is .8 inch, and at belly .5. Unfortunately the outer part of the head has been recently broken off, but sufficient remains to show that there was no mouth. In contrast with fig. 1, *a*, this head was set firmly on the body. The chin is very angular. The hand appears to have only two broad fingers, wide spread, but probably it is unfinished. The foot is clearly shown in the photograph and is 2.2 inches long. The edge of the belly was squared and the other parts rounded. The carving was nowhere carried under the figure as in *a*. The surface is rough, and has probably not been rubbed. No doubt this figure is incomplete.

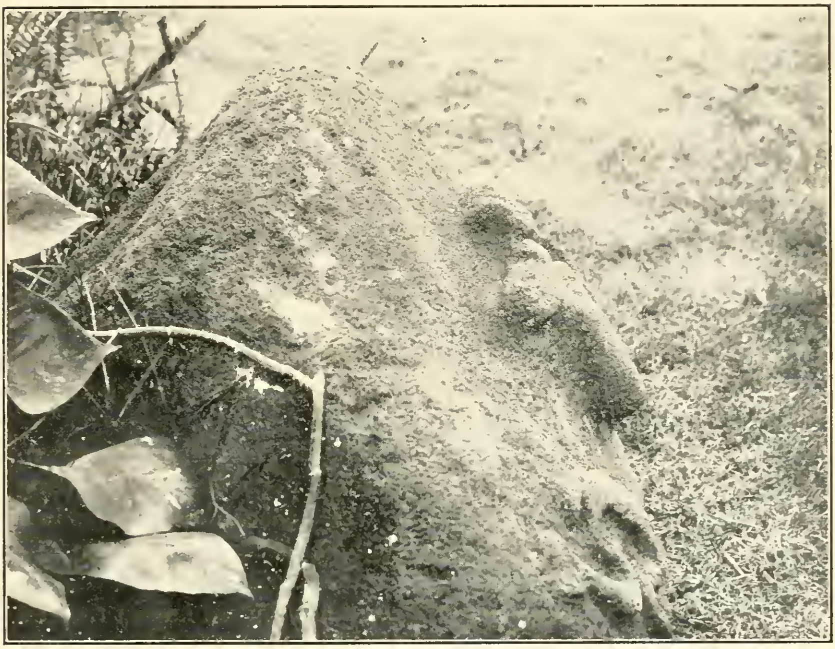


FIG. 2. BACK VIEW OF *a*.

That the sculptures were made in these islands there can be little doubt. Though the stone has not been chemically analyzed, it is of a kind very common at Moanalua, forming a stratum four or five feet thick in the cliff of that valley. It might be surmised that the work was done with stone tools[1] from the pittings on the unfinished portions. Even were a dull metal instrument employed, it might be expected that the pittings would be deeper and that there would be evidence of an occasional glancing blow. It might be mentioned that the numerous imitations of stone idols seen in these days show nothing of the care with which these figures have been carved. The land where the stone was found was uninhabited from the middle of last century until about 1891 (when Mr. Damon's dairy was installed). There is one point yet to be cleared up. Mr. John Cullen, Mr. Damon's rancher, employed two men to prepare the small piece of land for planting, and a number of stones were dug up and used to fence the land, the stone in question, for some reason unknown, being left in the field. These men have since left the country. After their departure, Mr. Cullen, a staunch North Briton, seeing the stone in the field and wondering why it had not been placed in the wall with the others, made an examination and found the sculpturings. If ever the two men are heard from, more may be learned concerning the details of the discovery.

Before accepting the petroglyphs as of Hawaiian conception, it would be well to consider the carving in profile, the squatting position and the detail of the limbs, which place these figures in a class apart from the Hawaiian petroglyphs so far discovered. The native wooden images were carved with a close attention to detail. The stone idols mostly consist of a crudely carved face at the end of a stone, but on all the Hawaiian idols observed, the nose was distinct. In fig. *a* there was sufficient space for the artist to carve a nose in place of the low ridge by which he indicated the central line of the face. In this respect fig. *a* calls to mind the figures on the Marquesan bone carvings and wooden stilt rests. The Rev. Wm. Ellis gives an illustration[2] of a wooden idol with a long head and similar features, which was secured by Rev. John Williams in Rarotonga. Edge-Partington and Heape[3] figure another one, accredited to the same island, but it is doubtful how much consideration should be given these resemblances.

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[1] An illustration of shaping poi pounders by chipping with pebbles may be seen in Mem. B. P. B. Mus., vol. i, p. 375, fig. 39.

[2] Polynesian Researches, London, 1830. Vol. ii, frontispiece, upper right hand corner.

[3] Ethnographical Album, first series, plate 23, fig. 6.

The carving in profile and position of the limbs of the petroglyphs seem to find close analogy to a figure carved on stone and seen at Orongo, Easter Island, by Mr. W. J. Thompson.[4] This figure was perhaps another form of the god Meke-meke[5] which Mr. Thompson says was the most common figure carved at that part of the island. However, an examination of the numerous tablets illustrated in the plates accompanying Mr. Thompson's work will show a character, with variations, closely resembling the former figure, which, from the freqency of its occurrence, might be considered as a representation of a human form portrayed in various acts. Among the Maori carvings, birds and lizards are found in profile, but the conventionalized human figure is always presented with full face, even when the body is seen in profile.

The squatting position of the figures is not uncommon in Polynesia, as seen in these islands, remarked by the missionaries at Tahiti,[6] by Melville[7] at Nukuhiwa, and by Rev. Wm. Ellis[8] at Huaheine.

The sculpturing in relief has already been observed on two Hawaiian stone lamps, one of which was recently purchased by this Museum with the Deverill collection (fig. 3), and the other, with a similar figure on one side only, was seen by the writer in 1900 on board a small local steamer which was wrecked a few days later. However, these figures have no other resemblance to those at present under discussion. The Bishop Museum is in possession of two stone fish gods with carvings of fish in relief. One, from the Deverill collection, represents a human head, with the face very well made and the neck shaped like a fish tail, the whole giving the suggestion of a round-bodied fish. At the back of the head a smaller fish two-thirds the length of the whole, has been carved in relief. The length of the idol is 8.5 inches. The second fish god is a thick stone roughly triangular in plan, with top and bottom flat and sides perpendicular. The top has been worked down at the edges for about an inch, leaving the shape of a deep flat-bodied fish, nine inches long. The material in both these specimens is a very hard compact lava.

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[4] Te Pito te Henua, by Paymaster William J. Thompson, U. S. Nat. Mus. Report for 1889, p. 481, fig. 7.

[5] Ibid, fig. 8.

[6] Missionary Voyage of the Duff, London, 1799, p. 77.

[7] Typee, New York, 1876, pp. 74 and 257.

[8] Polynesian Researches, London, 1830, vol. ii, pp. 209 and 210.

Returning to the first subject. It is evident that the work was done here from the fact that it is unfinished, apart from the improbability of such a heavy stone being transported in canoes. The stone is comparatively soft and would not weather well, though being buried in a comparatively dry soil, it might last indefinitely. From its incomplete state and the fact of its burial, it might be argued that it was being carved at the time of the abolition of the tabu in 1819, and that the sculptor hid it for preservation during the general destruction of idols which followed. This concealment of images by their devoted attendants has been the means of preserving many valuable specimens to the present day.

Seeking the significance of the figures—it is not yet understood if the various Hawaiian petroglyphs are to be considered in the light of a written language. The natives belonging to Moanalua now living had not seen the stone, and the best explanation the oldest inhabitant could give was that the figures represented the mythical giant lizard, "Moo", which was ever present in native superstitions. The same suggestion has been made by natives from other islands of this group, but only from appearances.

A first glance at the figures would suggest two human beings in the act of prayer, but the older natives consulted, do not associate this position with that taken by Hawaiians engaged in the old forms of prayers. They describe several postures—depending on the nature of the prayer—standing, on hands and knees, on elbows and knees with forehead resting on the hands, sitting with legs and hands folded, also sitting with legs to one side and hands on the ground. In all these positions, they say that the head should be hung. The observant Ellis[9] when at Huahine, noted some of the positions taken by the southern Polynesians in prayer, and remarked: "The petitioner did not address the god standing or prostrate, but knelt on one knee, sat cross-legged, or in a crouching position, on a broad flat stone, leaning his back against an upright basaltic column, at the extremity of a smooth pavement, usually six or ten yards from the front of the idol." A little later on,[10] referring to his request of an old blind priest at Parea, Huahine, for a repetition of one of the ancient prayers: "After great persuasion, he consented, and assuming the crouching position, or sitting as it were on his heels, he commenced...."

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[9] Polynesian Researches, London, 1830, vol. ii, p. 209.

The writer is indebted to Dr. Brigham for the suggestion that the figures represent two people asleep, the position of the head following naturally the use of a hard pillow.

The idea that the figures represent deities appeals to the writer more than that of their being intended for mortals, following the claim of two old natives, who asserted that the figures must be gods since their faces looked upward. It is not to be expected that the Polynesian would expend the amount of arduous labor required to carve these figures so carefully, for any other than a sacred purpose, and the position of the arms and heads, indicating the act of eating or drinking, calls to mind the stories told of the offerings to the gods and spirits of deified ancestors, of food, but especially drink in the form of awa, which the gods were believed to have consumed. Were the stone found on the shore instead of a mile inland, it could be reasonably concluded that the figures were intended for Kuula, the fish god, and Hina his wife, whose names are generally linked together. These gods were worshipped at every fishing ground and in any convenient form, from a shapeless boulder to a well carved image.

Figure 3 shows a side and two end views of a stone lamp of basalt (No. 9338) purchased from the estate of the late W. E. H. Deverill, of Kauai. Unfortunately no history of the circumstances pertaining to its discovery have been preserved, but there are two recent abrasions on the outer surface, which might well indicate that the specimen was found when ploughing—a frequent means of discovery of many valuable stone implements in these islands. The upper edge of the lamp has been broken off to a depth varying from one-half to one inch, but the break is an old one as is shown by the soot clinging to the broken surface. The inner portion is heavily coated with soot. The Hawaiian lamps have been described already by Dr. Brigham,[11] but the cup in this lamp differs from that in other specimens in the Museum both in size and shape. The usual form has a roughly cylindrical hole, with bot-

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[10] Ibid, p. 210.

[11] Mem. B. P. B. Mus., vol. i, pp. 391-398.

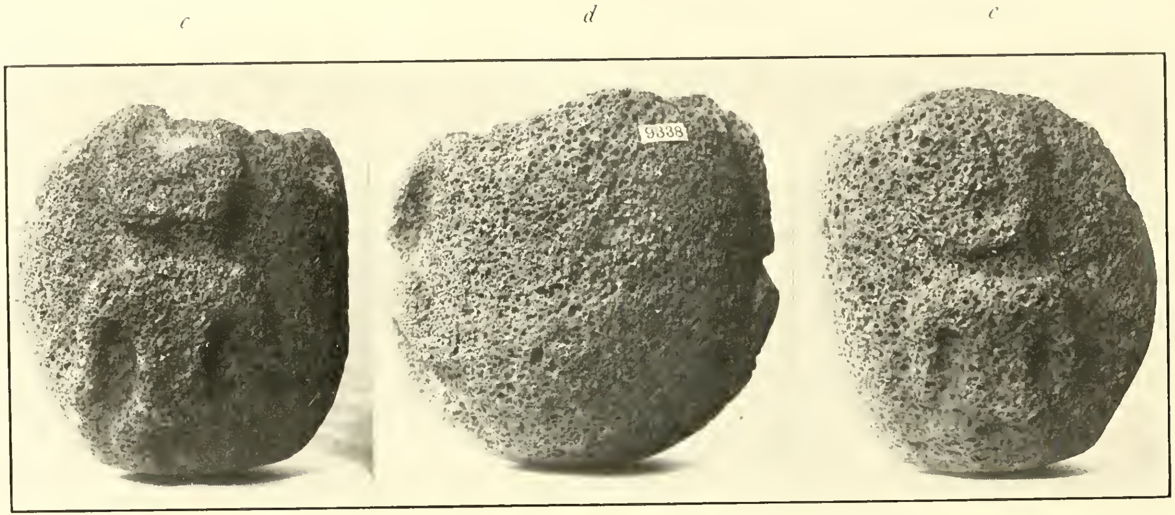

FIG. 3. SCULPTURED STONE LAMP.

tom more or less flat, sometimes varied with another small pit in the middle. The cup in specimen No. 9338 is ovately conical, with a diameter of 2.8 to 3 inches at the edge and a depth of 3.5 inches. In this specimen, the greater outside diameter is 7.4, lesser 6.4 and height 6.6 inches. A raised figure of human form adorns each end, each 6.3 inches high. The noses are in evidence, while to represent the eyes and mouths, there are slight depressions. Small projections represent the ears. The legs are very short and are without feet. They were gradually worked down and disappear at the edge of the convex bottom of the lamp. The lower portion of the arms of fig. *c* are bent out a little to represent hands, and are seen more clearly in fig. *d*. In fig. *c* the breadth of shoulder is 3 inches, and the height in relief .8 inch, while in fig. *e* the measurements are 2.8 and .7 respectively.

The use of the human figure in native art as a means of ornamenting utensils occurred among the higher castes of Hawaiians, as is evidenced in some wooden bowls and dishes preserved in this and other museums. In regard to the intention of the carving being merely ornamental, a legend has been handed down with specimen No. 408 in this Museum to the effect that the figures supporting the dish represented Kahahana, the king of Oahu (conquered and slain by Kahekili of Maui) and his wife Kekuapoi-ula, who were shown in the carvings in the menial position of offering food and holding their mouths wide open as salt cellars.[12] It might reasonably be believed that the dish was the work of a Maui artist with the idea of degrading the memory of the vanquished Oahu king. The custom of honoring or dishonoring the memory of the deceased by the use of human teeth and bones inlaid in implements, has been referred to by Dr. Brigham.[13] We might regard the figures ornamenting the stone lamp under discussion as representing persons in native history destined by the art of the sculptor to guard the lamp for all time, but whether as an honorable occupation or a menial task, we cannot decide.

This specimen of native stone work is probably unique, the only other lamp of like workmanship known, having been lost as before narrated.

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[12] Mem. B. P. B. Mus., vol. ii, p. 162.

[13] Ibid, pp. 368, 369, pl. xxxi.

While the following may not be apropos of the subject of this paper, it is submitted with the hope that it may be of use in locating the debated site of the human bone fence or house known as "Kaualua". There is an old native of Moanalua, aged 88, who has lived at Kalihi, a neighboring valley, for the past twenty-five years. From the old man's descriptions and the writer's measurements it appeared that the stone described in the first part of this article was found immediately near the Kaualua. The coincidence the writer thought might be of value as a clue to the significance of the petroglyphs. As the old native was very feeble, the writer awaited an opportunity when he should feel strong enough to drive to Moanalua and point out the exact spot where the Kaualua stood. This proved to be 700 feet away from the place where the stone was found, which fact the writer considered was sufficient to remove any probability of connection between the two. The native's opinion could not be shaken, and suggestions of other sites had no influence with him. The surveyors in these islands have found the Hawaiians invaluable in pointing out old boundaries in the former complicated land system, and it is generally conceded that the native testimony on land matters is reliable. The old man's story will be told in its sequence.

Fornander[14] gives the following in connection with the massacre of the Oahu people by Kahekili, king of Maui, after the conquest: "It is related that one of the Maui chiefs, named Kalaikoa, caused the bones of the slain to be scraped and cleaned, and that the quantity collected was so great that he built a house for himself, the walls of which were laid up entirely of the skeletons of the slain. The skulls of Elani, Konamanu, and Kalakioonui adorned the portals of this horrible house. The house was called 'Kauwalua', and was situated at Lapakea in Moanalua, as one passes by the old upper road to Ewa. The site is still pointed out, but the bones have received burial." Fornander's account does not agree with the story told by the Moanalua natives today, which is repeated as briefly as possible: "Kalaikoa was chief of the district, lived right by the old highway where it crossed the cliff, and occupied himself by waylaying the travelers and killing them for the purpose of getting their bones to build a fence around his house. He was secure from reprisals, as he had a strong body of soldiers at his call. After killing his victims he extracted the long arm and leg bones and planted them upright in the ground to make a low palisade. Retribution overtook the bloodthirsty chief, for when he had the fence completed, except for the bones of one man, he died, and his bones were used to fill the gap."

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[14] A. Fornander, Polynesian Race, vol. ii, London, 1880, p. 226.

Lapakea is in the valley, about 500 feet away from the cliff. Were all details known today, the two versions would probably be found to fit together, except in regard to the bone "house". The old man's story agrees with the last, except that he says that the bones of two men were needed to complete the fence when Kalaikoa died. He had seen the fence, and the following details were gleaned on the spot: The fence was composed of the leg and arm bones placed erect in the ground as close together as the fingers when relaxed. They were not tied. There was a single line of fence, making a square enclosure, one side of which was fifty feet (paced). In this enclosure was a large stone platform on which the grass house had stood, but there was no house standing when he first saw the place. Well outside the enclosure, 60 feet to the south, was a small house, built entirely of stone, into which the remaining portions of the murdered bodies were put. He had seen the bones there himself. The house was not an *imu* (underground stone-lined oven) but of proper house shape, large enough for the body of a man. The road passed between this and the fence.

This house the old man spoke of as a "heiau" dedicated to the war god Kaili. It had walls three feet high and four feet wide, with a pitched roof of stone and a door facing the bone fence. Outside the door was a stone pavement, where the priests gathered.

As pointed out, the Kaualua was in the land of the same name close to the boundary of Puu Kapu. The land of Kaualua is a small piece on the plateau about 600 feet wide between Puu Kapu and Puu o Ma'o. The boundaries of the various small sections were named for the writer's edification as they were passed. The site of the Kaualua is now occupied by a well built private road and was found at the place where the road passes over a subway used as a cattle drive.

The description given by Peter Corney[15] in 1818 of a bone fence on Oahu, although not specifying the locality, is probably a true account of the Kaualua, as there has been no mention of more than one such place in the islands. "In my tour with Mr. Manning (Manini), we visited the ruin of a large stone house, or fort, which had formerly belonged to a great chief; it had a double fence of human bones around it; these were the bones of his enemies killed in the war before the islands were visited by Europeans. The bones of this great chief are said to be still in the house; the natives are afraid to go near it, preferring to go a round of five or six miles to passing it." The road to Pearl Harbor, whither Captain Corney was bound, passed through the land of Kaualua at that time.

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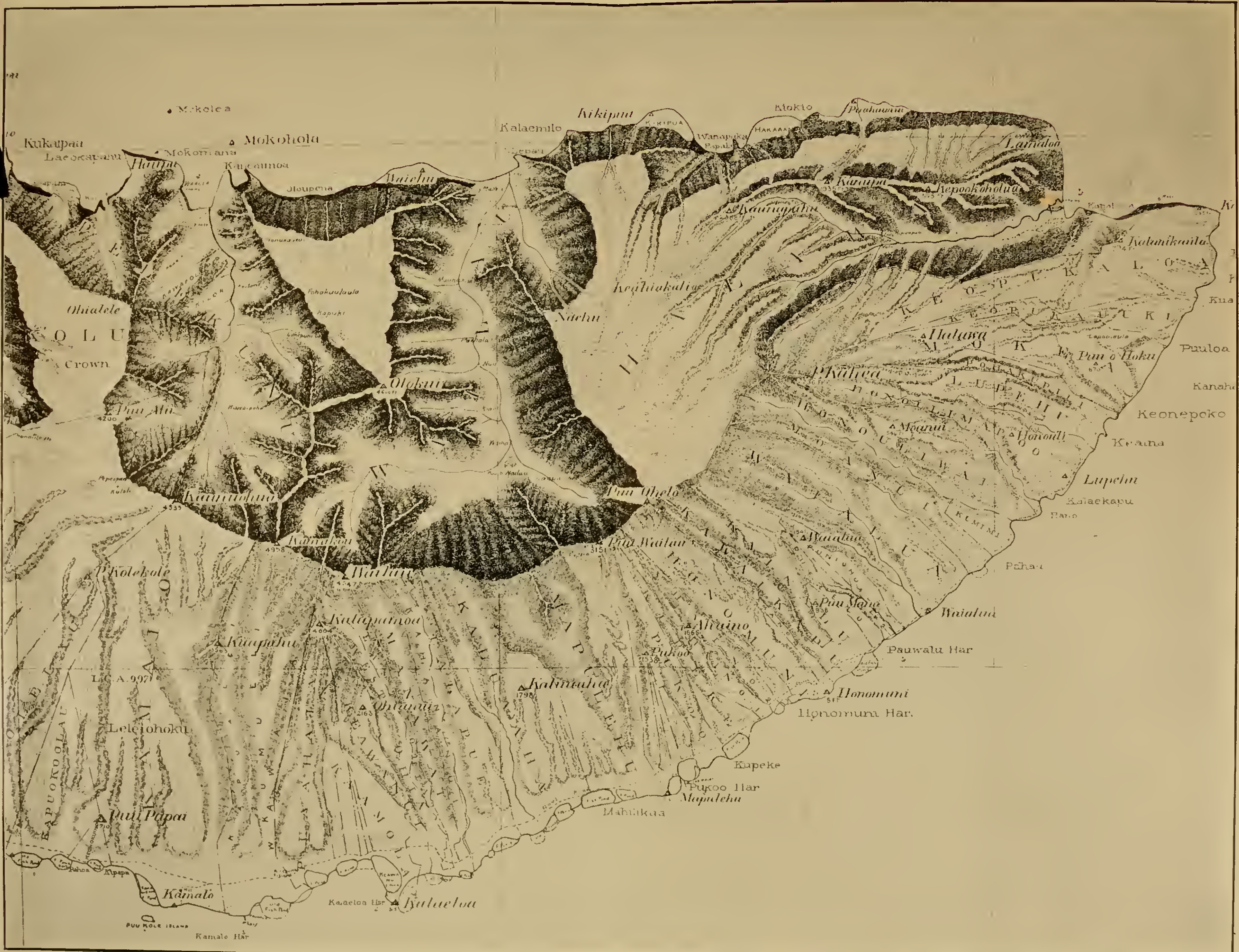
[15] Peter Corney, Early Northern Pacific Voyages. Edited by W. D. Alexander. Pp. 114 and 115. Honolulu (T. G. Thrum), 1896.



Mokolea
Kukaiau
Mokohola
Mokomana
Kalaemilo
Kikipua
Kiokio
Lamaloa
Kanupa
Kepookoholua
Waiehu
Olokui
Ohialele
Crown
Puu Alii
Kaunuohua
Kamakou
Waikolu
Kaulahu
Pikolekole
Kaluapamoa
Kaupulehu
Ohiamuiu
Kalimahau
Leleiohoku
Puu Papai
Kamalo
Kamalo Har
Puu Kole Island
Kalaeloa
Kaaelon Har
Mahuikaa
Mapulehu
Pukoo Har
Kupeke
Honomuni
Honomuni Har.
Pauwalu Har
Waialua
Puu Maua
Ahaino
Pukoo
Puu Ohelo
Puu Waihau
Naehu
Keahiakalia
Kaunuohu
Halawa
Pikolea
Moanui
Puu o Hoku
Kalanikaula
Puuloa
Kanaha
Keonepoko
Keaina
Lupehu
Kalaekapu
Paha-u
Kua
Kapai
Wanapaka
Hakaaano
L.G.A. 997

EASTERN END OF MOLOKAI. FROM GOVERNMENT MAP.

Some Birds of Molokai.

By Wm. Alanson Bryan.

With a view to securing suitable material for the series of Hawaiian bird groups being assembled in the Bishop Museum, the writer spent two months (April 15 to June 15, 1907) collecting in the mountains of Molokai. The collecting of the skins and the necessary material required in the Museum's work afforded a favorable opportunity for making some detailed field observations on the nests and habits of many of the birds found on this seldom visited island. In addition to a general report of the expedition, the Molokai Olomao (*Phæornis rutha*) is herein described as new and shown to be a species closely allied to *P. lanaiensis* with which it has formerly been united.

The popular and, in a large degree, the scientific interest in the expedition centers about the securing of specimens of the Hoa or Black Mamo (*Drepanorhamphus funereus*) which is one of the rarest of living birds. The search of the forests was made with a view to securing specimens of this species if possible. As a consequence the collecting of other mountain birds was in a sense incidental to this main endeavor. Locating the present haunts of the few remaining examples of the Hoa, made frequent change of station necessary, and, as a result, practically the whole forest area of the island was visited before the coveted locality was finally found. The most extended stay, however, was made at Kamoku camp, and it was at this place that most of the material here reported was obtained.

Kamoku camp is a shelter cabin belonging to the Molokai ranch. It is located on the southwest side of Hanakalilolilo mountain, near the head of Waikolu valley, and it is well suited to the requirements of the collector. It is about 4000 feet elevation and on the edge of the great bog forest at the head of Waikolu and Pelekunu valleys. In this vicinity have been secured most of the specimens of birds of the island, now in museums. The region is also important as the type locality for the Hoa and certain other birds peculiar to Molokai.

The second camp was at the eastern end of the island near the mountain Kaunapahu and beside one of the many streams which unite to pour their waters into the head of Halawa valley. From this station trails were cut through to Wailau valley and then extended to the left to reach the centre of the Halawa headwater country—a region which had never been thoroughly explored.

The third, and in many ways the most successful camp, was made back of Moanui ranch, near the head waters of the Waialua stream. The fourth and last station was directly back of Mapulehu, within a short distance of the pali of Wailau valley. From all of these stations, as centres, excursions were made in various directions. By reference to the map it will be seen that the forested eastern half of the island, which is the portion of greatest interest to the ornithologist, was accessible from the stations mentioned. From the different camps referred to I was able at least to visit all of the favorable localities, while the more important collecting grounds were very thoroughly explored.

What has been said elsewhere[1] of the difficulties attending the collecting of birds in the mountains of the Hawaiian group is especially true of the mountains on Molokai. Indeed it is impossible in a brief description to give an idea of a region so varied and broken, representing, as it does, all the main features of a wild semi-tropical forest and a group of volcanic mountains combined.

For various reasons the wet bog forest at the head of Waikolu and Pelekunu valleys is conceded to be the most difficult collecting ground in the Hawaiian Islands. It is situated at a sufficient elevation to be drenched by almost continuous rains, and as a result the verdure is always most luxuriant. Under foot, at all times, is a perfect quagmire up to one's knees. Overhead the tangle of vines, aerial roots, ferns, bushes, and standing and fallen trees—all completely overgrown with moss and slime—are so woven together as to produce an almost impenetrable jungle. Great palis drop down perpendicularly for hundreds of feet. Narrow, fissure-like, forest-hidden valleys, running in all directions, add to the difficulty of getting about, while numerous vine-covered well-like holes, often a hundred or more feet deep, play no small part in furnishing an ever present source of real, though hidden, danger to one working in the region. Add to all these and a hundred other material things the discomforts of the cold drenching rains, the dripping forests, and the dense—oftimes bewildering—clouds of fog that envelope everything, and there would seem to have been little omitted that would add to the discomfort of the collector.

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[1] Notes on the Birds of Kauai, Bryan and Seale, Occ. Papers B. P. B. Mus., vol. i. no. 3. p. 129. Notes on the Birds of Waianae Mountains, Bryan, Ibid, vol. ii, p. 235, etc.

The Halawa district is even more discouraging to the naturalist. The country—an otherwise sloping plain—is cut into long sharp ridges by numerous, almost countless, streams and tributary ramifying valleys, all converging to pour their waters down Moaula and Hipuapua falls, into the beautiful Halawa valley. Throughout this headwater region Ieie (*Freycinetia*) vines run rampant. The trail must be cleared of them at every step. Splendid trees are so overgrown and completely hidden by them that when one looks over the forest from a point of vantage there is little else than ieie in sight. The difficulties and mishaps incident to carrying a gun and working one's way for days through such a snarl can be better imagined than described. It is not uncommon for one to be forced to abandon the ground entirely, and to climb for considerable distances over the bushes and low trees; often one is twenty feet or more from the ground, on top of the tangle of vines. To find the small and inconspicuously colored birds after they have dropped to the ground through such a maze is a task of no mean proportion: often hours of fruitless labor can be thus expended.

Though less boggy than Pelekunu, and less overgrown with vines than Halawa, the stations at Moanui and Mapulehu each presented physical obstacles to the collector that are, in their way, almost as difficult to surmount. Among them might be mentioned the long narrow ridges and impassable waterfalls at Moanui, and the precipitous palis of Wailau and Mapulehu.

In general it may be said that the forests of the island are characteristically timbered with the common native trees of the group, save for the striking exception of the Koa (*Acacia*) which is entirely wanting in the Molokai mountains. The Ohia (*Metrosideros*) is everywhere the most conspicuous, and, to the ornithologist, the most important tree. Wild banana (*Musa*), several kinds of the large lobelias, the Kopiko (*Straussia*), Olema (*Perrottetia*), and a number of other trees, are common in the higher ranges, while Kukui (*Aleurites*) is an abundant species in the valleys and on the lower ridges, where, as in the valleys on the windward side, it grows to an immense size.

As elsewhere in the group, the timbered area is now more limited in extent than formerly. That this reduction in area has worked a hardship on the avifauna throughout the islands is well known. However, on Molokai more than anywhere else, has the change in the forest and its inhabitants been allowed to come about naturally, through causes inherent in the fauna and its habitat. For this reason, fairly reliable testimony, even of a meagre nature, concerning the existence and subsequent disappearance of certain birds, before the introduction and spread of foreign plants, animals, or conditions, is of great interest. It may be regarded as suggesting what would probably have occured in time from innate causes existing in the fauna or its environment, even though the introduced causes with which we are familiar, had never become active. As a matter of fact, the impending extermination of certain Molokai birds cannot, in any just way, be attributed to introduced disturbing conditions. In certain other cases, however, it would seem to be entirely due to conditions brought about since the coming of the white race.

The weather throughout the trip was, I am told, unusually wet and cold. Heavy rains were of almost daily occurrence, while cloudy, gloomy weather was almost continuous. This not only interfered with collecting, but caused many birds to abandon their nests—often after they had been completed, and I had marked them for study.

For much of the success of the trip the writer's, as well as the Museum's, thanks are due to the directors of the Molokai ranch for many special courtesies and privileges. I wish personally, to make especial acknowledgment of the kindness and hospitality extended by Messrs. James Munro, C. C. Conradt, O. Tollefson and C. E. King.

LIST OF BIRDS.

Micranous hawaiiensis (Roths.).

A few examples were seen at sea off the Wailau side of the island. There is a cave on the coast between Pelekunu and Waikolu, through which it is possible to row a canoe at low tide, that is used by this species as a nesting and roosting place. Although I did not visit the cave, I am reliably informed that the thousands of little Hawaiian Tern or Noio make this their home.

Æstrelata sandwichensis Ridgw.

Œstrelata sandwichensis Ridgway, Water B. N. Am., ii, p. 395 (1884).

Although the Uau is to be seen at the proper seasons on the channels between the various islands of the group, and has for generations been hunted by the Hawaiians for food, not to mention its having long ago been made to figure in a very popular legend of the natives, it has continued to remain one of the rarest of the Hawaiian birds in museum collections.

Up to the present, save for an immature specimen in the Bishop Museum that was collected by Mr. Henshaw on the beach at Hilo, in 1900, the species has been known only from a skin "from the Sandwich Islands" in the U. S. National Museum (No. 61,259), collected by Mr. V. Knudsen, and a second specimen taken by him on Kauai, now in the British Museum. It is, therefore, with considerable satisfaction that I report on a fine series of adult skins which I secured on Molokai during the month of June.

On April 26, while at the residence of Mr. John Walker, in Pelekunu valley, I was shown, in a cabinet of curiosities, a roughly mounted specimen of the Uau. The bird had been collected by Mrs. Walker three or four years before the time of my visit, one morning, asleep in the long grass on the hills back of the village, and not far from Mrs. Walker's house. The specimen was kindly given to me for examination. The following morning, at an early hour, I heard a solitary bird calling from high up on the cliffs near the village where I had spent the night. I at once made an effort among the natives to organize an Uau hunt. They all agreed that it was not the proper season for securing birds, saying that it would be useless to make the severe climb up the mountain to where the birds' nests were. Some weeks later, they assured me, Uau would be much more plentiful. As it is impossible to find the birds' burrows without specially trained dogs, which only the natives have, I was forced to give up the project for the time being.

My next meeting with the Uau was on May 9. I was on a two day camping trip on the Kaunuohua trail, which leads down the pali into Pelekunu valley. The object of the trip was to spend a late evening and early morning in that locality, in the hope of hearing the call, and, if possible, secure specimens of the Oo, since the bird, in former times, frequented that section. On the way down, at about a 3500 foot level, I found the bill, wings, feet and some loose feathers of an Uau that had been killed and eaten by some animal, presumably a mongoose, not more than the day before. That night I went into camp beside the trail in a drenching rain. The camp was not an elaborate affair, simply a few ieie vines and ferns piled on a narrow shelf on the pali, the ledge being scarcely wide enough to lie on. The face of the pali was almost perpendicular for hundreds of feet above and below me. In fact, it was so steep that it was necessary, as a precaution, to drive stakes along the lower side of my bed to prevent the possibility of its slipping off the edge and my rolling off during the night.

Shortly after dark I began to hear the strange, weird cry of these petrels, as they sailed about the cliffs, evidently attracted by, and much exercised over, my campfire. All night long—long after the fires had died out—they could be heard calling here and there about my "swallow nest" camp. A long drawn out U-a-u, suggesting the wail of a lonesome cat, would be answered by Uau-ka-ka-ka-ka-ka, a note just petrel enough to be recognized as such, yet combining such a number of other suggestive sounds, as to render it both indescribable and unforgetable. Though they frequently flew close to me, there was so much heavy fog that it was useless to shoot in the dark, besides it would have been almost impossible to have secured a bird from the precipice below me if it had been killed by a chance shot. The experiences of the night, however, were enough to assure me that the petrels were about in sufficient numbers to warrant an effort to secure specimens, when I could manage the undertaking.

For the next few days following my Pelekunu experience with the birds, I was camped at Halawa and Moanui. At the former place, although far from any habitation and in a rugged country, I did not hear nor see a single Uau. At Moanui, on the other hand, they were seen each evening at dusk flying over the headlands close down beside the sea. Three specimens were taken June 5 and 6. It is rather curious that all the birds seen flew along the coast toward the east, against the wind, while later on, on the windward side of the island, the birds were seen to return to their rookeries from all directions. A possible explanation would be that the birds prefer to follow along coast line to their nesting places on the opposite side of the island, rather than to take the more direct route over the mountains through the fog.

A favorable opportunity for visiting the nesting colonies of the Uau did not come until June 14, when I made a trip down into Wailau—the valley lying next east of Pelekunu—for that especial purpose. On the way over the pali from Mapulehu, about half way down the Wailau trail, a half-eaten carcass of one of these birds was found, under similar conditions to the one noted from Pelekunu valley.

At Wailau village I rallied a party of these experienced native bird catchers, with their Uau dogs, for a day's hunt on the almost vertical cliffs of Olokui. For there, well down towards the sea end of this great pyramid-shaped mountain, at an elevation between 3500 and 4000 feet, a colony of these birds have reared their young each season for generations. Each year, during the summer months, the natives of the valley have formed hunting parties and have preyed upon the colony in search of the young Uau, which are regarded as an especial delicacy by all Hawaiians.

Our start was an early and auspicious one. My men were each provided with a bag which was held on the back, suspended from the shoulders, in approved native fashion. Save for my collecting gun, we were without firearms and unencumbered. The day was bright, with occasional showers—just sufficient to keep every leaf in the moss-grown forest soaked and dripping. Only the most hardy and venturesome natives ever attempt this climb. For four hours we struggled up the steep ascent, cutting the trail through the tangled undergrowth, helping each other up the cliffs where footholds were wanting, pulling ourselves up by our hands here, slipping back there, passing the dogs over the dangerous places, encouraging them over the hard ones, panting, wringing wet, and all but exhausted, we at last reached the top where the crest of the ridge slopes down a few hundred feet before it pitches off for a perpendicular drop to the floor of the beautiful balloon-shaped valley two or three thousand feet below. The crest of the ridge, here as elsewhere, is overgrown with the usual jungle of vines, ferns and trees which hide the steep, broken—often dangerous—irregularities of the rocks which it covers.

For the next six hours we ranged over the mountain side, each of us following as best he could, some one of the dogs. Over the cliffs and down the valleys they ran in every direction, sniffing here, digging there, until finally on locating a bird they would bark for help.

Digging out an Uau is not the easy and pleasant task one might imagine. As a rule they make their burrows under the spreading surface roots of trees—sometimes going back under them several feet from the mouth of the burrow. Occasionally they select a crevice in the broken rock or underneath a boulder that is overgrown with roots and vines, so as to resemble, in its essential features, the site just described. Rarely—almost never—are they found nesting on the surface of the ground, even though it be covered with vines and undergrowth. Having located the burrow and opened it up for a distance, it is often then difficult to find the bird, for the holes are usually natural ones that follow the roots in various directions, and at most are only appropriated by the bird and modified to its use. But once the hand touches the bird there is no further doubt concerning its whereabouts, for on being disturbed they bite with their hooked, pincer-like bills, and kick and scratch with their feet most savagely. Once the bird is in hand it is easily despatched by the native hunter in a neat and efficient manner. The forefinger is violently forced down the bird's throat. It is then slightly bent at the first joint so as to catch the heart and lungs, which are given a slight twist and sharp pull, with the result that the bird dies instantly, with scarcely a struggle.

One can with practice, imitate the Uau's call very closely. This ruse was continually resorted to by the natives. Their efforts would occasionally be answered by some unwary bird, thus disclosing its whereabouts, but as a rule they failed to respond. Earlier in the season, during the actual mating, the call is more generally given and answered by the birds throughout the day, but by the time of our visit the birds were mated and sitting together in the burrows. On several occasions two birds were pulled from the same burrow. Later on, I was informed, when the single glossy white egg is laid, it is a common occurrence to find one or the other parent birds sleeping outside the burrow, while its mate sits on the nest within.

July is given as the time when the egg is laid. The young in the downy stage, are always taken in late September and October. October 10 is the day usually selected by the natives as the most favorable time for collecting the downy young. These are commonly pulled from the holes by means of a stick which is split at one end. The split end is twisted into the down of the bird and in this manner it is easily pulled forth. But the adults must be captured and dragged out by the hand. As has been said, the young birds are especially prized as food. In former times they were reserved for the chiefs alone, being tabu to the common people.

As a result of the day's expedition, twenty-one Uau were taken, eighteen of which were made into skins. Compared with former years, this was a very unsatisfactory bag. In June, 1906, the same men, with the same dogs, and with much less effort, secured sixty-three birds. The cause in the decrease in numbers was not far to seek. Along the trail, as we ascended Olokui, we found the remains of three birds that had been killed and eaten by mongoose. It was a common thing when following the dogs, to have them lead us to deserted burrows, the occupants of which had been devoured but a few feet from their homes. In one hole we found a female mongoose with a flourishing family of five little ones, that had taken possession of an Uau burrow after its occupant had been killed. From the foregoing data, when taken in connection with the wide distribution of the mongoose in the group, it seems certain that the Uau is doomed to rapid extermination.

Turning to the series of eight males and twelve females, all in the full adult plumage, I am impressed by the remarkable uniformity of color and size exhibited by it. A table showing the maximum, minimum and average measurements of the series is given, the measurements being in inches. The culminicorn is measured from the anterior end of the nostril to the tip of the bill.

EIGHT MALES.

	Wing	Tail	Tarsus	Toe	Culmen	D. of B.	Culminicorn
Minimum	10.85	5.20	1.30	1.80	1.17	.55	.90
Average	11.04	5.33	1.34	1.85	1.21	.55	.90
Maximum	11.15	5.40	1.40	1.90	1.25	.58	.90

TWELVE FEMALES.

	Wing	Tail	Tarsus	Toe	Culmen	D. of B.	Culminicorn
Minimum	11.00	5.25	1.30	1.70	1.17	.53	.85
Average	11.15	5.33	1.34	1.82	1.21	.55	.91
Maximum	11.40	5.40	1.40	1.85	1.25	.57	.95

The average length of both sexes is about 15.50. A June female of its nearest relative, *Æstrelata phæopygia* Salvin, from the Galapagos Ids., in the Museum's collection, measures: wing 11.85, tail 5.50, tarsus 1.45, toe 2.00, culmen 1.35, depth of bill .62, culminicorn .96. The measurements of a series of birds from the Galapagos, as given by Rothschild (Avifauna of Laysan, etc., p. 290), is "wing from 11.6 to 12.50, averaging from 11.8 to 12 inches, tail 5.8 to 6.3 and 6.4, metatarsus about 1.4 to 1.5."

It will be noted that the Museum's specimens from the Galapagos, with the exception of the tail, falls well within the average, as quoted from Rothschild. The specimen may, therefore, be taken as a representative of that series. Since it is a June specimen, it is specially useful in comparison with the Molokai series.

In comparison, it will be seen that in all maximum dimensions, the Hawaiian birds fall safely below the minimum given for the Galapagos series, but nowhere is this difference more noticeable than in the size and form of the beak. This difference, though marked, is difficult to describe, but it may be stated definitely that in *sandwichensis* the bill is much more slender, the nail more strongly deflected at the tip, and the nostrils thinner and less prominent. These differences are constant throughout the Molokai series. The color characters are even more obscure. However, the slaty black terminal bands on three or four of the shorter auxiliaries forming a patch on the side of the body under the wings in Galapagos specimens are entirely wanting in all Hawaiian specimens in the Museum; even the immature bird from Hilo beach. In *sandwichensis* the white frontal band is wider and the black bases to the white feathers composing it do not reach to the base of the beak, as in *phæopygia*. The whole back and wings are blackish slate, with the feathers of the mantle inconspicuously, if at all, marked, with paler tips (not slate black with conspicuous whitish terminals as in *phæopygia*). The outer pair of tail feathers, viewed from above, vary somewhat, but they are always in both adult and immature birds, strongly mottled with white on their inner, and to some extent, on their outer webs.

I regard *phæopygia* and *sandwichensis* as distinct, though closely allied species with the latter possessing characters of color, measurement and habitat sufficiently marked to distinguish it from the former in all ages and both sexes. I, therefore, adopt Ridgway's name as published in the text of the Water Birds of North America (vol. ii, p. 395. 1884) as the proper designation for the Uau (not Uuau as sometimes erroneously given), or Hawaiian Dark-rumped Petrel.

Puffinus newelli Henshaw.

Unfortunately, I did not secure a specimen of this rare bird, though I had the pleasure of examining one that had been preserved by Mrs. Wilson. It had been collected some years before, from one of the steep cliffs toward the summit of the mountain between Pelekunu and Waikolu valleys. The description taken from it accords exactly with a specimen in the Museum collection from Kauai. The bird is known on Molokai as Ao—the name being an imitation of its nocturnal cry. Pelekunu natives informed me that during the "bird season", early in October, the adults and young can be collected in considerable numbers from the cliffs. They were quite clear as to the distinguishing characters between the Uau and the Ao; giving differences which an unobservant person would have passed over. Therefore, I have every reason to have confidence in what they told me concerning their habits. They assured me that some birds were seen, or rather heard, throughout the year (?), but that they became plentiful about the first of May. From that date on all through the summer months, they would hear them each night call out "A-o", as they left their burrows to fly out to sea. They were commonly found colonized in the steepest parts of the pali, 500 or 1000 feet or more from the floor of the valley. The Uau as a rule, have their colonies higher up, seldom less than 1500 feet above the sea. Occasionally, however, both birds are found in the same colony—on rare occasions in the same hole. The Wailau natives who accompanied me on the Uau hunt just described, verified these statements. They were at some loss to account for the absence of Ao from among our catch of Uau, since last year, in June, they got both species. I heard the call of the Ao in the two valleys mentioned several times, but am convinced that it is much the rarer of the two birds.

Phaëthon lepturus Lacep. & Daun.

From the cliffs at the heads of the principal valleys, in fine weather, we can always see one, sometimes five or six, of the White-tailed Tropic Bird or Koae, gracefully floating about the cliffs far below. While no specimens were secured, I had no difficulty in satisfying myself that only the white-tailed species frequent the precipices there. As yet the bird is fairly common, being noted on a number of occasions, at different places about the island. However, it has already begun to suffer from the depredations of the mongoose, which is known to be on the increase everywhere on the island, especially in such localities as the Koae favors for breeding places.

Fregata aquila Linn.

The Iwa was seen on two occasions a considerable distance out at sea. Specimens are shot from time to time when they fly in close to the beach.

Anas wyvilliana Sclater.

No specimens of the Hawaiian duck were seen, and I doubt very much if there any now living in the island. Several persons informed me that some years ago it was always to be seen in the streams—frequenting the pools high up in the mountains. Lately they have disappeared. Doubtless the few pairs that in the past have found a congenial habitat along the streams at the Halawa end of the island have been preyed upon by the mongoose.

Nycticorax nycticorax nævius (Bodd).

On May 30 I shot an adult male Auku Kohili from a tree beside the Honouliwai stream well up into the mountains. The bird is not common at the higher elevations—only two or three being seen there. But towards dusk, on the beach, especially at Moanui and Mapulehu, they were common flying from the valleys to fish from the walls of the mullet ponds along the coast.

Mr. O. Tollefson's son relates that while he was returning from the mountains one day along the Honouliwai stream, he saw at some distance ahead of him an Auku sitting on a rock in the stream, evidently still-hunting for fish. As he was watching the bird a mongoose came out of the shrubbery along the stream and pounced on the solitary fisherman. The bird and the animal engaged in a desperate struggle, resulting in the death of the Auku before the boy could interfere. Although he gave immediate chase, the mongoose succeeded in dragging its prey from boulder to boulder out of the stream and into a crevice in the rocky bank, from which it was impossible to dislodge the animal.

Gallinula sandvicensis Streets.

This species is common on the island, being seen in the taro ponds in Wailau, Pelekunu and Halawa valleys.

Fulica alai Peale.

I did not find the Alae keokeo, but am told that it is to be seen on the mud flat at Palaau, a locality I was not able to visit.

Himantopus knudseni Stejn.

The Kukuluaeo or Hawaiian Stilt is a resident species at Palaau where the young have been taken in June.

Lophortyx californica (Shaw).

The California Quail is common, though not abundant, on Molokai, frequenting the open country on the western end of the island. The mother birds were being followed by their half-grown young in May.

Phasianus torquatus Gmel.

The Ring-necked Pheasant is a well established introduced species on Molokai.

Phasianus versicolor Vieill.

Like the last, the Japanese Pheasant is common on the island. Both species keep to the open country or the edge of the forests, seldom, if ever, entering the deeper woods.

Spilopelia chinensis Scop.

The Chinese Turtle Dove is occasionally seen in the deepest native forests, though it is more commonly found nesting in the introduced Algaroba (*Prosopis*) along the coast about Kaunakakai. There is but little rice or grain of any kind raised in Molokai, hence the dove does not find as congenial a habitat there as on Oahu for example.

Asio accipitrinus sandwichensis (Blox.).

In the Director's Report for 1904 (Oc. P. B. P. B. Mus., vol. ii, p. 241) I published a note on the nesting habits of the Pueo. To the data there given I am now able to add a third date for the nesting period of the Hawaiian Owl. While moving my camp into the Halawa headwater region, well back of Hipuapua falls, on May 24, I found a nest of the Pueo, in a swaile which had formerly been a large wild banana patch, three or four acres in extent. My guide was in advance and stepped directly over the mother-bird without noticing her. Fortunately, the bird did not take flight, and I was able to catch her in my hand as she crouched on the nest. The nest contained one recently hatched young, and five lustreless white eggs, all of which were well advanced in incubation.

The young bird was not more than a day old. It was covered with very short, fine, creamy buff down, and looked very helpless and comical. The nest itself was unpretentious in the extreme, being simply a few dry spears of grass and a dozen feathers from the parent's breast, not enough, all told, to keep the eggs off the wet boggy ground. Beside the nest was a half-eaten rat.

The adult, young and eggs were taken and left that night at the camp. The following day, during my absence, a mongoose found the eggs on top of a wood-pile shelter, where I had left them temporarily, and destroyed them all. The parent-bird was in very worn plumage, and measured: wing 11.90, tail 4.50, culmen 1.10, tarsus 1.40. The young birds have now been taken from the nest on November 20, 1901, March 6, 1905, and May 24, 1907. These widely separated dates indicate that the Pueo nests at any time that suits its convenience. It is more abundant in Molokai than any other island of the group I have visited. In favorable localities it is to be seen each evening, sometimes as many as half a dozen at a time, flying about in search of food.

Alauda arvensis Linn.

The Skylark is now common on the grass lands of the island. Frequently as many as six or eight birds are in sight at a time as one rides or walks through the most favorable localities. The mongoose seems not to have interfered seriously with the nidification of this introduced songster, owing, no doubt, to the fact that it nests in the open field far away from any cover that would harbor this avowed enemy of all ground nesting birds.

Acridotheres tristis (Linn.).

The Mina is thought to be less numerous than in former years. If true, it may be due to the dying out of the lantana on the islands, since it is known to feed voraciously on the berries of this plant. Birds were seen about our camp at Kamoku, always keeping to the open fringing woods. At Halawa, however, they were seen further into the interior, but at no great elevation. Nowhere were they observed in conflict with the native birds. They are indeed so seldom seen in any numbers in the regions frequented by our native birds, that they can hardly be said to seriously affect the decrease or disappearance of the Hawaiian avifauna.

Carpodacus mexicanus obscurus McCall.

The House Finch or "Rice Bird" is common on Molokai. A nest—one of a number seen—was taken from an Ohia tree growing near Kamoku cabin at about 4000 feet elevation. It had been deserted, owing to the heavy late rains. The seeds in the grass, of which it was composed, had sprouted, some of the sprouts being two inches long, giving the structure the appearance of a ball of pale green moss.

Munia nisoria (Temm.).

The "Chinese Sparrow" was occasionally met with in small flocks on the lower levels about the island.

Drepanorhamphus funereus (Newton).

The Hoa, or "Oo-nuku-umu" as Perkins calls it, is exceedingly rare, so rare, indeed, that seven weeks of continuous field work in the forests of Molokai, its only habitat, were necessary before seeing or hearing, let alone securing a single specimen. The species was brought to our knowledge by Mr. Perkins, who first secured specimens in the forests at the head of Pelekunu valley in 1893. Judging by the number of specimens in the Bishop Museum, which received one-third of all the specimens he collected, not more than six birds were secured by him. The following year Mr. Theodore Meyer, a resident of Molokai, secured six specimens from the same locality, in six months of more or less continuous collecting. He believed the species to be extinct, as neither he nor any of his friends from then until now had been able to find the bird in any locality.

In March and April of the present year, Mr. George Munro spent four weeks in the type locality, with especial information as to its habits and calls, furnished him by Mr. Perkins. As Mr. Munro has had considerable experience in collecting Hawaiian birds, having accompanied Mr. Palmer on his expedition through the group, the fact that he did not find the Hoa added great weight to Mr. Meyer's opinion that since 1894 the bird had become extinct.

After spending three weeks in the woods about Pelekunu, having had the advantage of Mr. Perkins' notes, and Mr. Munro's experience, I left the Kamoku camp satisfied that there was scarcely a hope of finding even a chance specimen in that section. It seemed certain too, that unless the birds could be found in some one of two or three similar localities on the island, there could be but little doubt but that it had vanished from the Hawaiian forests forever. During the next ten days especially devoted to a search for the Hoa and the Oo, in the Halawa mountains—in a section probably never before hunted over, or perhaps never even visited by white men—under forest and climatic conditions suited to both species, I was unable to locate either of them, and quit the region thoroughly discouraged and disheartened.

The next attempt was made at Moanui ranch. Since it was here, and here only, that I secured specimens, a fuller account of the experiences of this part of the expedition will be of interest, as showing some of the difficulties attending the work in these mountains, as well as the character of the country in which a few Hoa still survive. After settling my camp at the Moanui mountain house on the morning of May 30, I set off alone up Honouluwai valley, that being regarded by Mr. Tollefson and his men at the ranch, as probably the most feasible way of getting back into the mountains. No one, to their knowledge, had reached the head of the stream; in fact, the mountainous part of the ranch was *terra incognita* to the owner of the ranch, and everyone else, for its back boundaries had never been surveyed, or even visited. By picking my way over the boulders in the bed of the stream and working around the small waterfalls, I made fairly rapid progress until late in the afternoon, when I came on a small waterfall where the stream poured over a steep ledge, twenty-five feet or more in height. On either side of the stream the solid rock ran up almost perpendicularly for three or four hundred feet. The only way to proceed seemed either to turn back and leave the stream entirely, or to scale the falls itself. Judging by the character of the country and similar experiences elsewhere, it seemed probable that the stream from this point on would be a series of more or less impassable waterfalls. Desiring to satisfy myself on this important point before returning for the day, I stripped off all my wearing apparel, save a stiff-brimmed rain hat, swam across the pool at the foot of the falls, and started to pick my way up the slippery rock over which the water poured. When three-fourths of the way up, my hands and feet suddenly slipped from under me. Coming down violently on my arm and side, and falling in such a way as to strike my head a stunning blow on a projecting rock, I rolled back into the pool of cold mountain water in an almost helpless condition. Fortunately, I was not completely stunned by the blow on my head, owing to the protecton afforded by the stiff brim of my hat. I was severely bruised as it was, but the shock of dropping backward into the pool revived me sufficiently to enable me to escape drowning. However, it took some time after I had pulled myself out of the water, to regain my strength. The mishap was a sufficient adventure for the day, and an experience that will never be forgotten.

After a day or so of rest, I had sufficiently recovered from my injuries to resume the quest. On inquiry, a native boy was found, who felt sure he had been beyond the falls where my unpleasant mishap had occurred. He was accordingly engaged as guide. By nine in the morning, we had arrived at the place where I had fallen into the pool. Without further delay my boy went two or three hundred yards down the stream and began to pick his way with great caution up along the side of the cliff on the Moanui side of the valley. After great exertion, and with much difficulty, in the time of which my guide got a fall which lamed him considerably, we at last got above the falls, and down into the stream again. Within ten minutes of the first falls, we found a second one that had been completely hidden from sight and sound by the first one encountered. It was seventy-five feet high, and poured over the ledge at a place that completely blocked the way, making further progress along the watercourse quite impossible. We could now hear the roar of another and still larger falls, only a little way on. The only thing remaining for us to do was to turn back and work our way up the Moanui side of the valley. This was exceedingly difficult to do. After five hours of the most laborious climbing, we at last, by two o'clock, made the crest of the ridge and could look down into the valley below. From where we stood one could have thrown a stone into the stream we had left, so nearly vertical was the rock wall we had scaled. From this point we kept on the ridge, cutting our trail a considerable distance into the mountains before night came on. On our return to camp late that night, we abandoned the stream entirely and opened a new trail down the main ridge.

Owing to the injuries resulting from his fall, my boy was unfit for duty the following day. In his stead an old, well informed mountain-going native was engaged. By an early hour we were at the farthest point reached the day before. For six hours, in the rain and fog, through a tangle of ieie and uhi (Smilax) vines, over, through, and under the moss-covered trees and roots, we forced our way still further up the ridge into the interior. It was the most uncomfortable sort of weather, and taken altogether it was exceedingly disagreeable, disheartening work. All day long we had not seen a single bird that could not have been collected in an hour's time by patiently waiting under any one of the flowering ohia trees we had passed by in the early morning on our way up the trail.

In the middle of the afternoon, I took the trail knife to give the old guide a chance to rest, for he had been chopping on the path since early morning. We were working in a particularly dense and unpromising jungle of ieie, when I heard a clear, gentle, even, inquiringly whistled "H–o–a" called by some bird not more than fifty yards away. It was a moment of intense excitement. There was little doubt in my mind but that the note was that of the bird I had so long sought. Making signs to the native to hurry to me with the gun, I began to imitate the whistle call as best I could. To my delight the curious black bird with the wonderfully curved bill, the object of my seeking, flew down and lit in a tree within ten feet of me! It was evident that curiosity aroused by my chopping had brought the bird to the spot to investigate.

Actively hopping and flitting from limb to limb, scarcely stopping a second, eyeing me sharply all the while, it persisted in keeping so close to me that I could not with safety fire even my auxiliary barrel. Yet the restlessness of the bird made it apparent that I must fire soon or lose my chance, for it the bird got fifty feet from me in the tangle of trees and vines on the side of the ridge, it would, in all probability be gone from sight and forever. I pulled the trigger and, to my consternation my gun missed fire. It was after all little wonder that gun and ammunition failed me, for both had been soaking wet for three days. The next few seconds were moments of painful indecision. To break and reload my gun would surely frighten the bird; to use the heavy charge in the left barrel was almost criminal, but my only recourse. Without further delay I availed myself of the first opportunity when the bird was screened by limbs and fired. The feathers flew: my first Black Mamo had been shot. Shot, but not found. "A bird in the hand" in the Hawaiian forests, is worth several in the bush, especially the bush in Molokai. Though the bird was not more than twenty-five feet from me when I fired, and my man and I both saw it start to fall, we searched for it in vain for three-quarters of an hour. We looked carefully under the vines and ferns, among the undergrowth in the trees, in fact everywhere for it, even seining a pool of water that had collected in the rocks a little farther below, yet not a sign of the coveted Hoa could we find. I had almost given up all hope of finding it, and began to save the few scattered feathers lying about, feeling that my claim to having found the rare bird would have to rest on such evidence as they could furnish.

As the search grew more hopeless, my native, who had assured me in the morning that he had heard of the Hoa, but had never seen such a bird as I described it to be, now became more earnest, as he declared to me that the bird just shot was not the Oo—the only other black bird known to him. As he was able to give the points wherein it differed from that now almost equally rare species, I felt his remarks were valuable as a convincing commentary on the scarcity of this bird. Here was a native hunter, familiar with the teachings of his fathers, whose knowledge of the forest had been gained almost half a century before, who knew not only the native names and uses of almost every plant we saw, but the names and habits of all the native birds, save this one, declaring it to be unknown to him. Yet we who understand something of Nature's processes, know that the Hoa has been for ages inhabiting these mountains, not six miles distant from, and in sight of the place where this man was born, and where he had lived all his life.

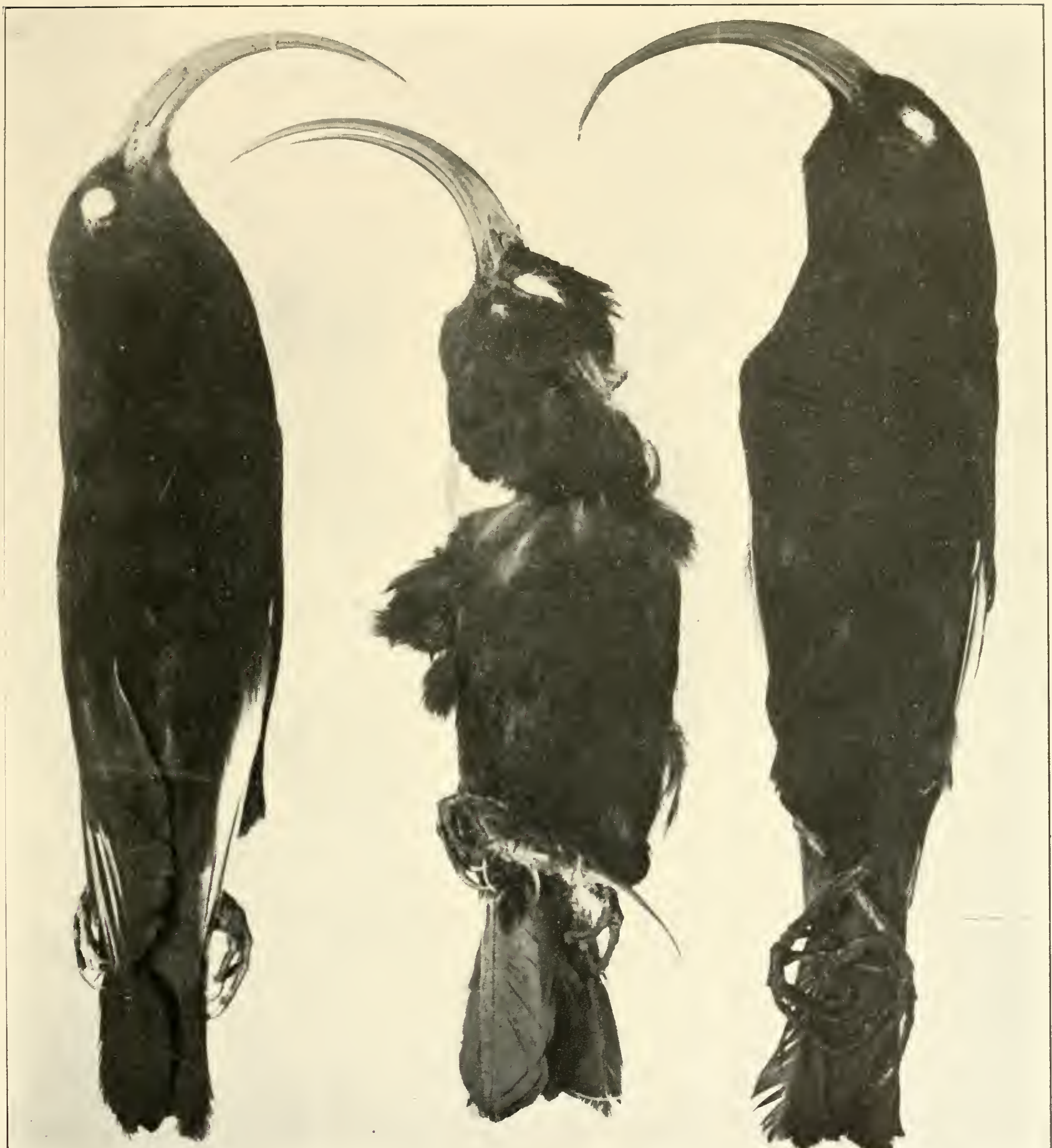
But to return to the search. As a last resort, I climbed up into the tree intending to drop a stone from the place the shot struck the limb the bird had been sitting on, in the hope of locating more acurately the spot where it should have struck the ground. To my joy I found the mangled remains hanging in the tree in a thick bunch of leaves, six feet or more beyond where it had been sitting. It was, as I feared, badly mutilated. However, it was made into a very fair cabinet skin.

Feeling that where one bird had been found others were likely to be, and being elated at the success of the day, I altered my plans so as to extend my stay in the locality. Accordingly, on the third of June, with my guide I packed my range tent and outfit into the mountains and established a new camp in the jungle, at the head of Waialua valley. The country here was so steep and rugged that it was difficult to find a place seven feet square that would do to pitch a tent on. I need hardly add that it rained continuously. The trail was continued along the ridge between Waialua and Honouliwai streams. Early in the afternoon I dismissed my native and continued on the trail alone. I had covered no great distance when under circumstances similar to those already described, I heard the call note "Hoa" again, this time a hundred yards or so in front of me. My best efforts at imitating it seemed to have no effect. I whistled and called and hoped. At first the bird answered my calls, then it failed to respond. I continued whistling until it seemed certain that it must have gone off in some direction, when, without reason or warning, my second Hoa flew and lit in a Kopiko tree, not fifty feet away and began to preen and spread its wings. Catching sight of me it began to work off through the woods. I fired, and this time had no difficulty in picking up a perfect adult male specimen. Though I stayed in in the vicinity for more than an hour nothing was seen or heard of its mate.

The following day found me early in the field. Though there was a steady downpour of cold rain I worked on until three o'clock. Not meeting with anything to encourage me, I climbed up into a tree preparatory to taking a last survey of the country, if there should come a rift in the dense fog clouds. Presently I caught a note entirely different from any I had yet heard. It was a rollicking whistle of five or six clear notes, which I was only partially able to reproduce. The bird, however, came nearer and finally lit in the thick branches of a tree fifty feet or so below me. In my haste to get down out of the tree I was in, some small limbs gave way, and I came clattering down quite a distance before I was able to regain my footing. That the disturbance had frightened the Hoa I felt quite certain, and was therefore agreeably surprised to find that through it all it had not moved from the tree where it had first lit. It seemed to be willing to be studied, an opportunity for which I was exceedingly grateful.

This bird, as well as the two former specimens, confined its range to the undergrowth, several times coming down to within three or four feet of the ground. At no time did it make a long flight or alight on the top of the trees. As it was raining all the while the bird was especially active in preening and shaking its feathers. The trees and vines were everywhere covered with thick wet moss, and although the bird hopped about from branch to branch, carefully inspecting each limb, I did not see it catch any insects, or even probe into the moss. Hopping from tree to tree, it worked its way around the head of the little side valley, up which it had come in answer to my call, to where a large purple-flowered lobelia was in profuse blossom, and began to feed. The ease and grace with which the feat was acomplished was indeed interesting, and left no doubt in my mind as to one of the probable causes of the remarkable development of the tongue and bill. The tongue was inserted with great precision, up to the nostrils, in the flower, while the bird balanced itself on the branches, assuming almost every imaginable attitude in its operations. In all three of the birds secured, the crown was smeared with the sticky purplish white pollen of this lobelia. I had a preconceived idea that the bird would also feed on the flowers of the wild banana. This conjecture I was not able to prove or disprove by my observations, further than that in each case no bananas were to be seen in the valleys below or anywhere in the vicinity where the birds were secured.

The third specimen, like the two preceding it proved to be a male, in perfect plumage. The bodies of the last two and the stomach of the first one—its body being badly mangled— are pre-



DREPANORHAMPHUS FUNEREUS.

served in alcohol for anatomical study. The series of three, so far as coloration, curvature of the beak, etc., are concerned, are identical. Their measurements, carefully taken, are:

No.	Sex.	Length.	Wing.	Tail.	Tarsus.	Toe.	Culmen.	D. of B.
4712	♂	9.35(?)	3.80(?)	3.10	1.20	.90	2.20	.37
4713	♂	9.50	3.90	3.10	1.25	.95	2.10	.37
4714	♂	9.40	3.95	2.95	1.20	.90	2.15	.37

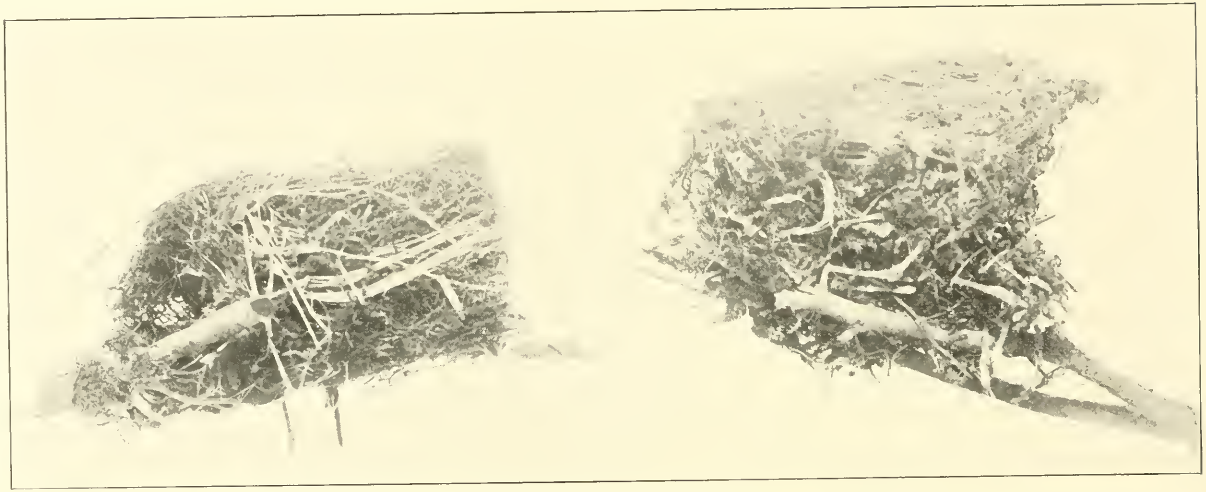
The chord of the largest of the curved tubular flowers of the lobelia on which the birds were feeding, is over two inches in length. After repeated inquiry among the oldest and best informed natives on the island, I was unable to find one who knew or had ever heard of the Black Mamo under the native name "Oo-nuku-umu." I did, however, find a few who knew of or identified the bird under the name Hoa.

Vestiaria coccinea Forster.

A series of ten carefully selected birds and three nests of the Iiwi were secured, which in themselves form a valuable set. Taken in connection with the Museum's long series they assume especial interest, making it possible, in another connection, to discuss intelligently from specimens in hand, some of the interesting problems connected with the evolution and development of the species.

Next to the Apapane and Amakihi, the Iiwi is the species most commonly met with on Molokai. They generally frequent the Ohia forests, but occasionally they will extend their range down, in certain seasons and under favorable conditions, as in Wailau and Pelekunu valleys, so as to reach the seashore. They are strong flyers, often mounting high in the air. In small loose flocks they will thus fly from one valley to another. Their flight over the tallest forest trees can be heard and easily distinguished, owing to the whirring noise of their wings, which is supposed to be produced by the peculiar truncated form of the primaries. Other species of the family, as the *Himatione*, having the same shaped primaries produce a similar though less marked whirring sound.

On June 10, while collecting on Wailau pali, I saw a parent bird in the brilliant plumage of the adult, feeding an immature



(4699) VESTIARIA COCCINEA. (4700)

young (Mus. No. 4626). The young bird was sucking the nectar from the Ohia flowers when the parent bird lit beside it. At this the young bird opened its beak to receive the food brought by its parent. The old bird flew away, only to return shortly to repeat the feeding operation. During the time intervening between the attentions of the parent, both old and young birds flew about and fed together. On examining the young bird's crop, several green looper worms were found.

Of the three well identified nests secured, the best specimen was one taken on June 4 from fifteen feet up in a Kawau (*Byronia*) tree, growing on the crest of the ridge well toward the top of Puu Ohelo Mountain. Although it was unoccupied it had every appearance of having been used in rearing a brood. Scarlet feathers from the breast of the parent bird found in the nest left no doubt of its identity, while from the tree the nest was in I shot a very young Iiwi, that presumably had but recently left the nest near by.

The nest (Mus. No. 4699) is mounted on a horizontal fork, and externally is 4.50 inches across by 2.75 inches deep. The bowl is 2.50 inches in diameter by 1.50 deep. Externally the structure is composed of the moss so common on the trees in the higher altitudes. Into this has been worked a few sticks and some fibre from the dead leaves of the Ieie vine. The inner lining is made almost entirely of the black hair-like fibres of dead moss. Generally speaking it is a very neat and compact structure.

The second nest (Mus. No. 4701) does not differ much from the one just described. In size it is a trifle larger, and was located in a terminal vertical fork of an Ohia tree. The material, especially the moss, is coarser than in the nest described.

The third nest (Mus. No. 4700) was not quite completed when collected on May 25 from the thick forests at Halawa. Like the last, it was placed in an Ohia ten feet or more from the ground. Wanting the lining, as it does, it might be mistaken as the completed nest of some other species as the Ieie fibres used in its construction make a very creditable lining. But a close examination of the size, shape and material used, so far as completed, shows it to be substantially the same as the first described. However, the moss is of a different species and a more liberal use is made of small twigs in the foundation, while as just said, Ieie leaf fibre enters extensively into the secondary lining. Only a few of the blackish moss stem fibres mentioned above, have been put in place, while two or three small wisps of pulu fibre have been woven into the brim. The eggs of the Iiwi are as yet undescribed.

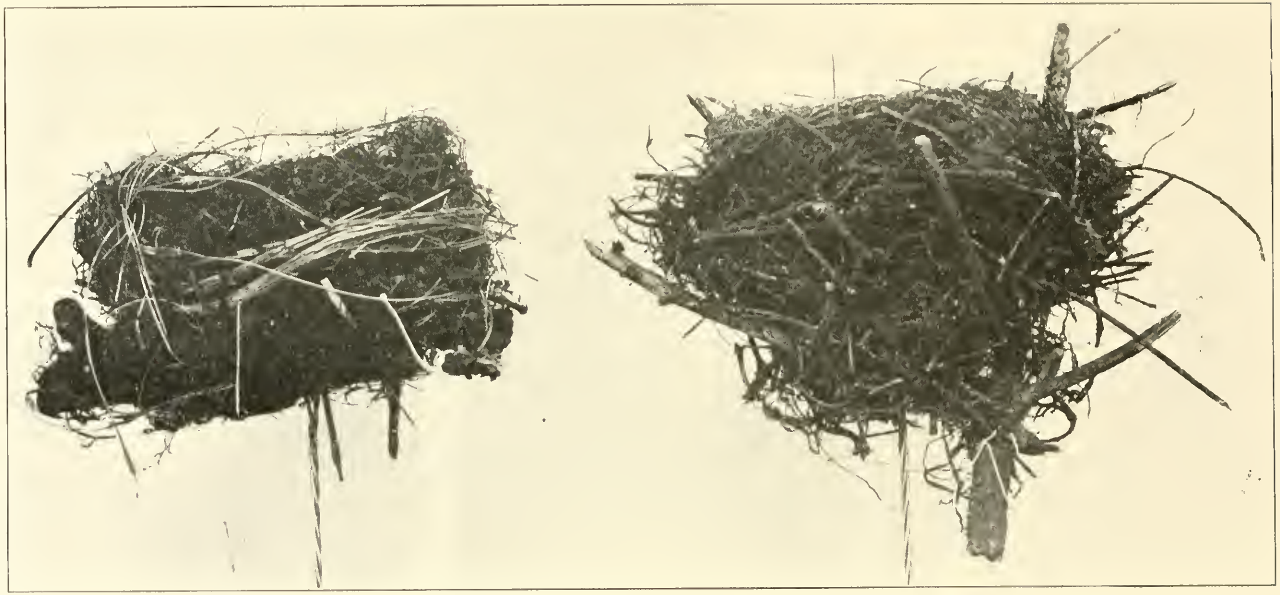
Palmeria dolei (Wilson).

I was unfortunate in not securing this species, though five individuals were seen in one flock at one time, and three at another, flying out over the pali at the head of Pelekunu valley. It was not seen or heard elsewhere. Mr. Munro, who immediately preceded me in the same woods, did not see the species at all during his month's work about Puualu Mountain. We therefore feel assured that though the bird is still to be had on Molokai, it is by no means as abundant as one might conclude from reading Mr. Perkins' account, published some years ago, where he records that he "assembled a flock of no less than nine adult birds at the same time in one small Ohia tree."

Himatione sanguinea (Gmel.).

The Apapane is the most abundant species on Molokai. A short series was taken for comparison with the Museum's material, which has been collected at the same season on the other islands of the group. The song and general habits have already been fully recorded elsewhere. However, certain observations concerning the mating performance seem to be new. During the early part of our stay the Apapane were in the height of the mating season. The song of both sexes was frequent and varied. Quarrels between the contesting males were of common occurrence, and were often apparently extended into feuds. During the excitement of the mating period either sex is easily decoyed by imitating the notes of the opposite sex. The love dance described elsewhere (Oc. P. B. P. B. Mus., vol. i, no. 2, p. 43) in the series of notes was repeatedly witnessed. In addition to the fluttering dance there described, on one occasion I saw it carried to the extent of the male bird affiectionately caressing its mate with the beak. The whole performance lasted several minutes.

The high palis of the island furnished an excellent opportunity to observe the Apapane in sustained flight. Flocks of seven



VESTIARIA COCCINEA. (4699)

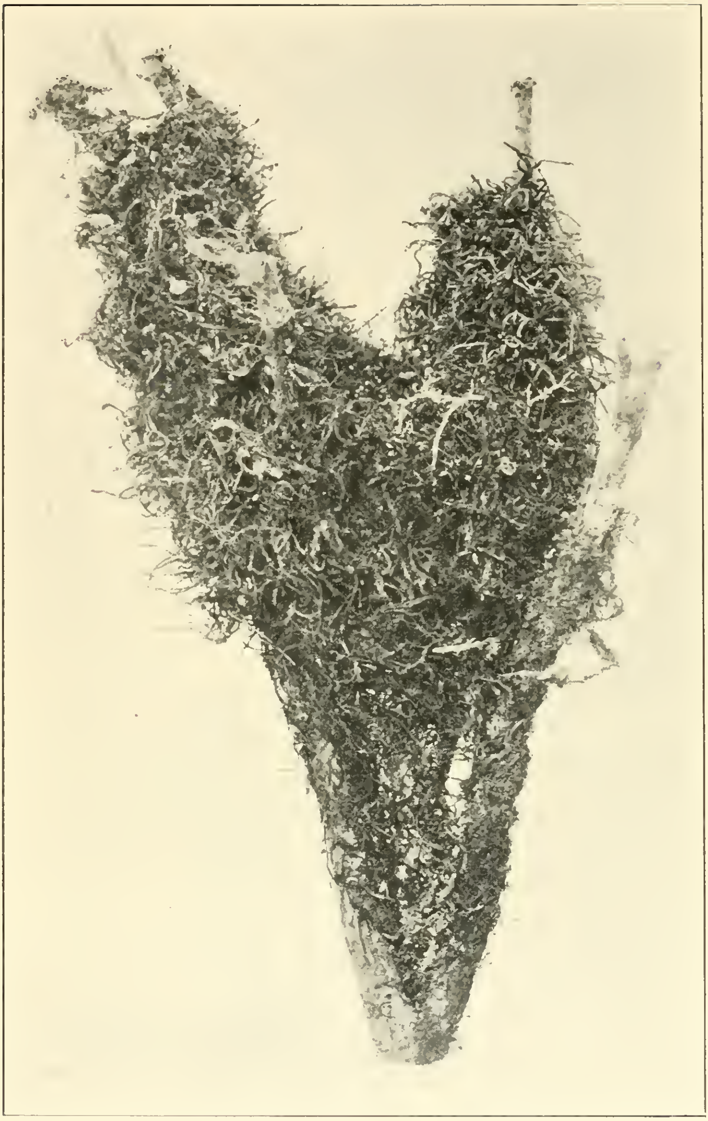
or eight or ten will, not infrequently, fly from the forests at the edge of these precipices, thousands of feet above the valley below, and with little concern, steer a course that will take them in a direct line as far as the eye can follow them. At nightfall they are to be seen returning from their feeding grounds lower down on the mountains or in the valleys flying swiftly and directly in the higher altitudes to roost. This daily migration over open land or from place to place is a very strongly marked characteristic of this bird.

A number of nests—but unfortunately no eggs—were secured. I am convinced that the nesting season cannot be well defined. In substantiation of this opinion, I find that in the series of skins collected, two are immature, while perhaps five times that number of brownish-colored young were noted among the hundreds of adults seen at close range. This fact, coupled with the mating performances and the enlarged testes and ovaries examined, would indicate that on this island, at least, an occasional late brood is reared.

The series of eight nests do not vary in material or location from those elsewhere described, to a degree sufficient to warrant their redescription. However, a deserted nest (Mus. No. 4683) taken from twenty feet up in a moss-covered Ohia tree which was growing in the heart of the Puualu forest, is somewhat extraordinary in that it has returned to the original elements of which it was composed *in situ*, leaving a replica of itself in living green moss. The structure is of some years standing evidently. Old enough at least, so that the moss and sticks of which it was composed have had time to almost completely disintegrate. That portion which remains has, in the meantime, become completely covered with living moss, so that the shape and general appearance of the nest is retained with just enough of the old structure remaining to account for its form and history.

Chlorodrepanis kalaana (Wilson).

Without here entering into a discussion of the very minute characters that have been used to separate this species from the very closely allied forms from Maui, Kauai and Oahu, it will be sufficient to say that the series of seventeen birds secured on Molokai, confirm rather than disprove the conclusions formerly arrived

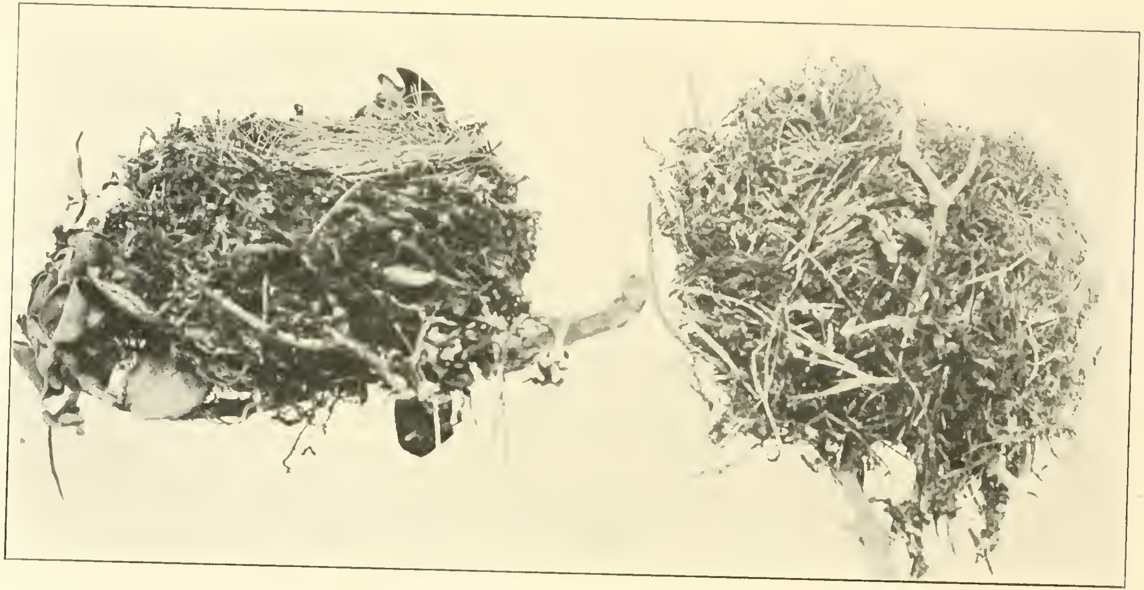


HIMATIONE SANGUINEA. (4683)

at—namely: that *kalaana* has been separated as a species on characters that are of doubtful sub-specific value. Was it not for the definite geographical factor which enters in for consideration, the form would hardly have impressed the original describer as being worthy of designation as a sub-species.

The Amakihi is the second species in abundance on the island, and was met with throughout the forested districts generally, often coming well down to the coast line on the weather side of the island, where conditions are favorable. The species is sociable by nature, usually feeding in small companies or at least, never singly. Their call note is a fine clearly whistled "Tse–et." This is usually given when for any reason an individual becomes detached from the flock or separated by any distance from its mate. The call note, as with most all the mountain birds, is given more frequently during foggy, cloudy weather, for obvious reasons. They are sure to be found where sunny slopes covered with open woods are interspersed with plenty of bushes and low shrubs. In such situations, if food is abundant, they become fairly established in their habits, often feeding over the same range a number of times each day. Their song on such occasions is usually frequent and identical, I believe, for both sexes. It consists simply of a repetition of "Ts–chee–chee–chee–chee–chee–chee", trilled without variation, in a surprisingly loud and penetrating voice, which always impresses one as being forced and metallic in quality.

Though generally favoring woods of the character described, they are to be met with in all sorts of places. I have found them —usually in isolated pairs, it is true—in the darkest and wettest parts of the forests, where flowers were almost wholly wanting. In such places they were feeding on the limbs and leaves of the trees high over head. At other times, they are plentiful on the low bushes growing on the sharp, and more or less dry and barren ridges. Or again, they will be met with on the outskirts of the forest feeding on the flowers and leaves of whatever species of tree or shrub was at hand, not even shunning the introduced species, as Lantana and Guava, which crowd well into the edge of the forests in some places. In their feeding, however, there is a preference shown for the Ohia both in and out of flower. Lobelias, especially the flowers, were seldom visited. But the white bloom,



(4693) CHLORODREPANIS KALAANA. (4698)

as well as the leaves, of the Scævola, were always carefully inspected by them.

The nests of this species, of which three fine specimens were collected, are so similar *inter se* as to be easily distinguished from nests of the other species on the island. Still they differ considerably, especially in the materials used, from others of the same genus now in the Museum collection. The most definitely identified, and best constructed nest (Mus. No. 4696) is one taken May 27, about half way down the Pelekunu pali. It was built in a stunted Ohia tree beside the trail and was poorly, if at all, concealed. It was placed on a horizontal limb fifteen feet from the ground, which brought it on a level with the path on the crest of the ridge. Its external dimensions are 5.00 inches across by 2.25 inches in depth. The bowl is 2.25 inches across by 1.25 inches in depth. Externally, the structure is loosely woven from green moss. Into this as a secondary lining, is worked some brown fibrous material of the color of pulu but resembling closely the soft inner bark of the Ohia. The lining proper is a generous one, composed entirely of the fibre of the dead leaves of the Ieie. The nest is a well woven compact structure. When first taken it was strongly scented by the peculiar drepanine odor, a trace of which still clings to it. Though no eggs were in the nest the parent bird was on when it was discovered.

A second nest, taken at Halawa May 24, is a sort of concession to civilization, being placed in the upright fork of a Lantana bush that was growing among the Ohia trees, a considerable distance into the forest. It is substantially the same as the one just described though not of as high order of workmanship.

Oreomystis flammea (Wilson).

Of this species an excellent select series was collected which shows the various stages through which the birds of both sexes go before attaining their adult plumage. In the field the flame-red males are in a decided minority, occurring in the ratio of about one in nine. But in my series of study specimens, they are in the ratio of one to three. This is owing to the tendency in the field to take the bright colored bird, and not (as might erroneously be concluded) because they are easier to obtain than the females or immature. The fully adult male at this season is usually accompanied by the female and from two to four parti-colored immature birds of both sexes. Occasionally young birds that have assumed more than three-fourths of the red plumage of the adult will be found in such companies. On the other hand one is rather more apt to find pairs mated and settled before the male has assumed one-third of the conspicuous red plumage to which he is heir.

In habits the Kakawahia resembles the species of the genus to which it belongs, and from which it differs in color so widely. They prefer to feed over the trunks and branches of the trees. Here they secure the insects that make up almost the whole of their diet. However, they will be seen in the tops of the tallest trees, but apparently paying little or no attention to their flowers. In short, they are persistent and sturdy entomologists, always active and alert, but strange to say, they seldom, if ever, take insects on the wing. At intervals moths are taken of such size they are compelled to hold them under their feet and pull them to pieces so as to devour them piecemeal, much after the fashion of the common chickadee.

When they have once settled on a home in the forest they at once set about to establish their sphere of influence, over which they rule, so far as possible, to the exclusion of every trespasser. On the approach of some intruder, as a man or a dog, they will both set up a scolding "Chirk, chirk", that is no uncertain sound to one familiar with birds' voices and ways. If the alarm chirk is continued long enough, the nearest neighbors are rarely so far away that they will not come in to satisfy their natural curiosity and add the weight of their presence and voice to the protest.

The Kakawahia, like his cousins, is full of curiosity. The sound of one making one's way through the woods is sure to attract the little resident to the scene, when uttering their never-varied "chirk", they will come close enough to the person to take in every detail of his makeup in wide-eyed inquisitiveness. Once satisfied that their show of authority has no intimidating effect, they will resume their feeding close to the observer. One can thus study their movements at close range. I have often watched them under the most favorable circumstances, for an hour or more at a time, but have never seen them paying the slightest attention to the nectar-bearing flowers about them. Occasionally they go down in the shrubs to within a foot or so of the ground, and it is probable that on rare occasions they do alight on the ground, although I have never seen them do so.

A good series of fairly well identified nests was taken, but the eggs were not secured and remain as yet unknown. The best specimen (Mus. No. 4691) was secured in the middle of the Halawa forest on May 27. I had climbed into an Ohia tree to take a survey of the surrounding country, when my attention was attracted by the disturbance being made by a fine red male Kakawahia, accompanied by its mate and three immature birds. They came up close to me and were loud and determined in their "chirks". Looking about for the cause, I found it in the shape of a nest but a few feet from me. It appeared to be just completed. It is made up of moss neatly woven together, and measures 4.00 inches in diameter by 2.75 inches deep. The interior is lined with the blackish root-like stems of dead moss and a few fibres from disintegrated Ieie leaves. The bowl is just over 2.00 inches across by 1.50 inches deep. A horizontal fork of an Ohia limb some fifteen feet from the ground has been used as the site.

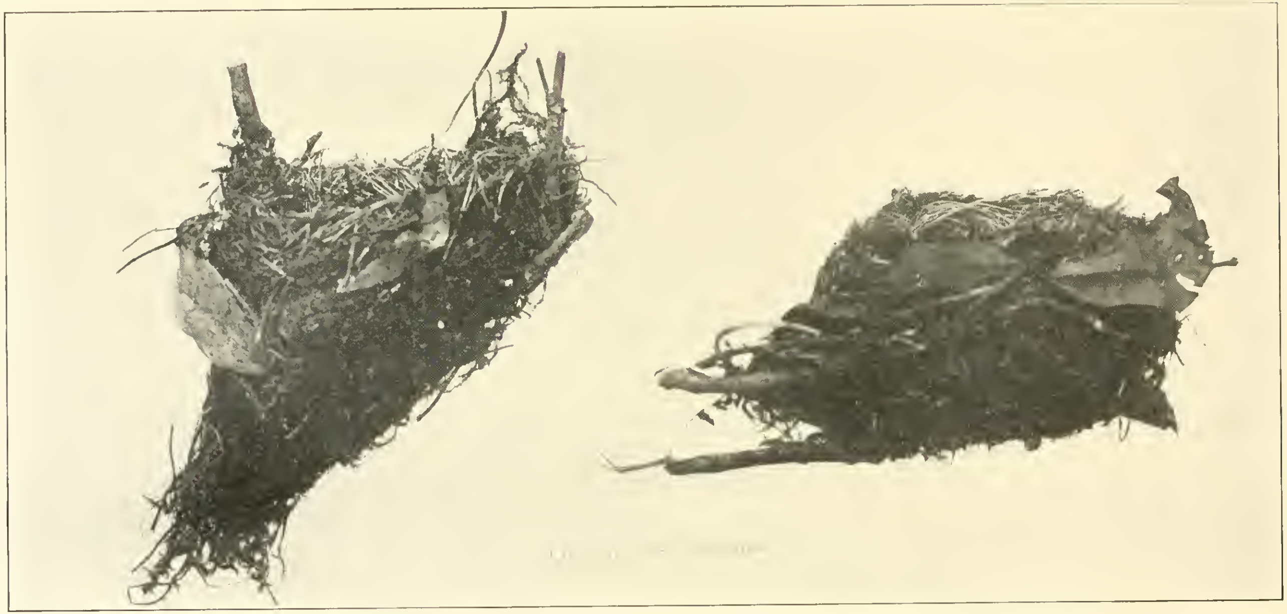
I conclude that the young birds following the adults were from a late brood of the year before, and doubtless would themselves not breed until the following fall or spring; though one of the young was well advanced in assuming the plumage of the adult.

The second nest (Mus. No. 4694) was also taken from an Ohia tree. It was collected at Mapulehu June 9, and is in every way similar to No. 4691, except that it was placed in an upright crotch.

A third nest, in an unfinished condition, was taken on Kilohana in the wet forest on April 30. The old bird was seen carrying the moss of which the exterior is composed. The site was an upright fork of a small Kawau tree about eight feet from the ground.

Psittirostra psittacea (Gmel.).

It is my intention in a separate paper to discuss at some length the Museum's choice series of almost a hundred skins of the Ou that have been collected on the large islands of the group. It is felt that certain questions that have been raised concerning this interesting genus can then be cleared up. For the present it is



(4694) OREOMYSTIS FLAMMEA. (4691)

sufficient to say that sixteen skins of both sexes, adult and immature, were secured on Molokai during April, May and June.

The Ou was met with at all the stations visited in the forest area, in a ratio of about one to twenty, as compared with the Amakihi. Hence it is not, relatively speaking, the abundant species its size and song would seem to make it, especially when compared with the much smaller and more obscurely colored *Chlorodrepanis*.

The Halawa forest makes an ideal home for this Ieie-loving bird, since that region, as has elsewhere been mentioned, is a perfect tangle of this vine. Along the streams patches of wild banana are also common, while Olona (*Touchardia*), another food plant of the species, is met with everywhere in suitable places. As Ieie has apparently had much to do in the evolution of its peculiar beak, the Ou commonly frequents the forests where it is most abundant. It is, nevertheless, always to be found in the more dense Ohia forests, even though the amount of Ieie is small, or wanting entirely. In the heavily wooded localities, it feeds through the tops of the trees, seldom coming near the ground. At such times there are usually several birds in the locality scattered about in scout formation. They seem rarely to alight together in the same tree, yet they always keep within easy call of each other. The inquiringly whistled call note "Psweet" is frequently given, and answered by birds thus deployed, especially during cloudy weather. If the call is imitated the bird will readily respond a number of times in succession, often cautiously approaching the observer to satisfy its curiosity. The young birds are much easier decoyed in this way than are the more experienced adults. It is not uncommon to have the green inconspicuously colored birds answer one from a tree near at hand, several minutes before its whereabouts can be determined. A number of times during drenching rains, I have heard the call note plaintively given, and after protracted search have found the bird standing motionless in a very dejected attitude, huddled close against a tree trunk, or stowed away in a thick bunch of leaves for shelter.

Of its musical powers much has been written, as it has been quite commonly given first place among the singing Drepanididæ. The song—which, by the way, it rarely gives in its entirety—is especially sweet and pleasing, resembling in many respects that of the canary. Perhaps the favorite place for delivering its song is from the topmost branch of some dead Ohia tree, standing in an opening in the dense surrounding forest. From such a station it will often sing intermittently for an hour or more. It is liable at any time to disappear in the woods, only to return presently to take up its song again.

The adult male is, by reason of its golden yellow head, a conspicuous bird, but with the head has been supplied a large amount of caution which results in it being much rarer in collections than would otherwise be the case. The female and the immature of both sexes are inconspicuously colored, and for that reason are often passed by the collector unobserved. As is so often the case, owing to the curiosity and want of fear in the young, more immature than adult birds are always collected.

The flight of the Ou is rapid, heavy and direct. During their more extended flights, as from one ridge to another, they are more often than otherwise in small flocks. Birds of both sexes answer a decoy whistle frequently, coming within easy range of one, eyeing the intruder narrowly all the while. A sudden motion, or an unusual noise will invariably put the bird to flight, when they will dart off without further ado, not infrequently flying half a mile or more in a direct line. Like the Apapane, I have observed the Ou making long-sustained flights from the palis of the large valleys, that carried them readily from one valley to another. At such times they rarely, if ever, soar or circle about, but set off directly for the fresher fields with a show of knowledge and determination that makes them while on the wing, easily distinguished from their neighbors, as far as they can be seen.

The series of skins give the following maximum, minimum and average measurements:

FOUR ADULT MALES.

	Length	Wing	Tail	Tarsus	Toe	Culmen
Minimum	7.00	3.50	2.20	87	90	60
Average	7.06	3.70	2.24	90	97	60
Maximum	7.25	3.80	2.40	92	1.05	60

FIVE FEMALES.

	Length	Wing	Tail	Tarsus	Toe	Culmen
Minimum	6.75	3.50	2.10	87	95	60
Average	7.00	3.61	2.22	90	95	60
Maximum	7.25	3.70	2.40	92	95	60

FOUR IMMATURE.

	Length	Wing	Tail	Tarsus	Toe	Culmen
Minimum	6.70	3.50	2.15	..	..	..
Average	6.92	3.59	2.20	..	95	60
Maximum	7.10	3.65	2.40	..	..	..

It is remarkable that the nesting habits of this bird, which has in times past been common on all the islands of the group and has been so generally collected and studied, should as yet remain entirely unknown.

Moho bishopi (Roths.).

After two months in the forest of the island, I have no hesitancy in pronouncing the Bishop Oo a very rare bird. During that time not a specimen was secured, nor was I able to hear so much as a sound that could be even attributed to it. This is the more remarkable since we know that its characteristic call can be heard in the forests, especially in the more favorable districts—as at the heads of the great valleys mentioned—for a half mile or more.

My disappointment at not securing this species was most keen. However, as the Museum received but three imperfect specimens as its third share of the collection made by Mr. Perkins, I feel sure the species was at that time (September and August, 1893) by no means common. Since the above date it has certainly very appreciably decreased in numbers, as Mr. Munro and I are ready to testify. The requirements of the Museum's exhibition and study series, no less than my desire to see and study the bird alive, nerved me to put forth every effort to discover its whereabouts. No pains were spared in making a thorough examination of every locality suited to its habits, as well as every place where it had been merely reported as having been seen in recent times. As a result, the wildest and most difficult parts of the island forests were visited, not once, but repeatedly. On several occasions a night or more was spent, sleeping in the open, in the centre of promising localities not to be reached otherwise, in the hope of hearing, if possible, the call of the Oo either in the late afternoon or early morning. Feeding grounds where the bird was reported to have been seen "in small flocks" a few months before, were revisited, usually accompanied by the persons reporting the observation, with the uniformly discouraging result. Virgin forest, unfrequented by man or beast, was traversed to no avail. Many hours were spent in silently watching and listening in places, where according to the oldest natives and even those of the present generation, birds were formerly to be met with, almost always on even the most casual day's ramble in the woods. Its feeding grounds among the

Ohia, the bananas and the lobelias were regularly visited. The deep gloomy woods, the bright forested ridges, the secluded valleys were explored from end to end of its habitat, all without seeing so much as a single sign of the bird to encourage one to further effort.

Nevertheless, since the present species, as well as its cousins on Kauai and Hawaii are known to be gregarious and nomadic at certain seasons, it may be that such habits account for its occasional appearance, and more frequent complete disappearance in certain sections. However that may be, of the fact that the Oo is a rare—indeed an exceedingly rare bird, there seems little question. As to its being already extinct, I am not yet convinced, but that it is very near the verge of extermination, cannot longer be doubted by any one.

Phæornis rutha, new species.

Type Specimens. Male: B. P. Bishop Museum No. 4631; Kilohana Mountain, Molokai; April 30, 1907; W. A. Bryan. Female: B. B. Bishop Museum No. 4632; Puualu Mountain, Molokai; April 22, 1907; W. A. Bryan. Immature Male: B. P. Bishop Museum No. 4628; Halawa, Molokai; May 25, 1907; W. A. Bryan.

Habitat. Forest area of the island of Molokai only.

Specific Characters. Similar to *lanaiensis* but with the throat and breast much grayer; abdomen and under tail coverts whiter; back darker olive-brown; size uniformly a trifle larger; bill averaging longer and slightly broader.

Diagnostic Characters. Uniform in color; above brown or hair-brown with an olive wash; with no conspicuous markings on the outer tail feathers; size larger, length (in the flesh) 8.25–8.40, wing 3.67–3.80, tail 3.10–3.25; darker above in adult and immature, and without any rusty gray cast on the crown and mantle. Grayer on the throat and breast.

Description of Type. Adult Male: Above inconspicuous dull brown with dusky olive tinge; head darker colored than the mantle. The grayish wash of *lanaiensis* over the head and rump wanting even in moulting birds. Outer webs of the inner primaries and most of the secondaries with a blackish patch at their bases, which is bordered before with a rusty brown patch; centre tail feathers like the back; outer pair paler on their outer webs on the basal portion, but not conspicuously so. Lores blackish and gray, grayest on the breast and palest on the throat; sides of the body like the breast. Flanks and thighs rusty olive. Centre of the abdomen clear white; under tail coverts ranging from pale buffy cream to white; bill black, iris brown; feet and tarsus dark brown; soles pale yellow in life. Length 8.25 (8.31)–8.40, wing 3.67 (3.73)–3.80, tail 3.10 (3.17)–3.25, tarsus 1.22, toe 1.00, culmen .72.

Adult Female: Similar to the male in color. Length 8.40, wing 3.70 (3.72)–3.75, tail 3.05 (3.09)–3.12, culmen .70.

Immature Male: Similar to young *lanaiensis*, but much darker and less rusty olive over the back; under parts uniformly grayer; wings and tail longer. Length 8.00, wing 3.65 (3.69)–3.75, tail 3.05 (3.11)–3.15, culmen .71.

When studying the material preparatory to writing my Key to the Hawaiian Birds, in 1899, I was convinced that the Molokai form would prove distinct from the Lanai form. Since then as the Museum's series of specimens from the two islands has increased, evidence has accumulated all tending to substantiate the premise there expressed (Memoir B. P. Bishop Museum, vol. i, p. 311) until now, with the additional series of twenty carefully sexed birds in the collection just made, there is no reason for hesitating longer in separating these two closely allied forms. This I have done, naming the Molokai Olomao in memory of my wife.

That the species from the two islands are very similar is not surprising, since the islands are only a few miles apart. Yet the conclusion which has been generally accepted, namely, that the birds from both islands cross the channel with sufficient frequency and regularity to keep the individuals of both habitats uniform, receives a serious rebuttal when we consider that neither Lanai nor Molokai has, to our knowledge, sent out settlers to the nearby and larger islands of Maui and Oahu, in sufficient numbers, if at all, to in the least way prevent the genus from disappearing entirely from the last mentioned islands, while they have continued to remain common on both Lanai and Molokai. A sufficient cause for their not throwing out stragglers or regular settlers is perfectly apparent when a close study of the genus is made in the field.

As is well known, all the species of *Phæornis* are highly sylvan, rarely leaving the deeper woods. Or, if occasionally inhabiting the more open parts of the woods, they are always of settled habits, frequenting the same sections throughout the year. They never seem to range very far from any particular locality where they have taken up a residence. If they do go afield, it is always by short covered flights. For the Olomao is by nature a shy, timid bird, and for that reason, instead of exposing itself in the open it prefers to proceed from place to place by short low flights, usually through the shade of the forest. Again, a flock of Olomao, even a flock in the most restricted sense, has, I believe, never been seen. When they rove about at all they are alone, or at most in pairs. In my experience with the genus on Kauai, Molokai and Hawaii, I have never seen them high up in the air, and sustain a flight of any distance above the tree tops. Their buoyant spirit not infrequently lifts them into the air in a prolonged burst of song, but when they have finished the effort they drop back into cover and if so minded, work off through the trees to some other favorite retreat. In marked contrast with the habits of the wide-ranging Apapane or Iiwi, I have never witnessed a bold flight of even a solitary individual from the high forest-clad palis where it abounds.

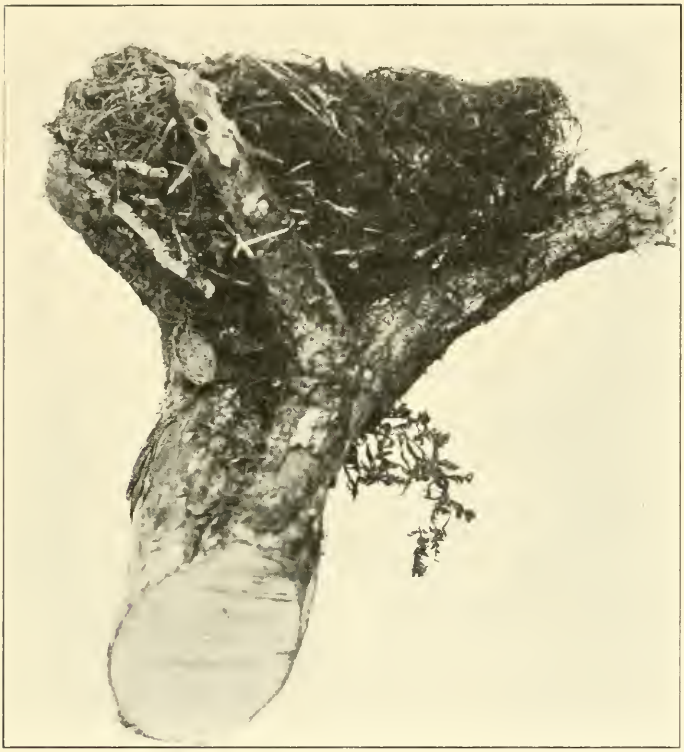
It would be perfectly possible physically for the Olómao to readily pass back and forth from Molokai to Lanai, or to Maui, or Oahu, so far as the inter-island distances and its power of flight are concerned. But I am convinced that its habits are such that it does not venture voluntarily on such flghts. Furthermore, by rarely exposing itself in the open or getting far from cover, it reduces the possibility of such migrations being accidentally made through the agencies of wind and weather to the minimum. Hence it is highly probable that the inter-island migration and breeding of sufficient numbers of the two forms to influence the mass of individuals on both islands sufficiently to keep them breeding to type does not occur.

The general habits of the Molokai species coincide very closely with those of the other species of the genus. Berries are by far its commonest food. While insects were found in the stomachs of a part of the birds examined, they occurred in no considerable quantity in any of them. Several times I came on the birds feeding on berries and had an opportunity to watch their behavior at close range unobserved. It was thus possible for me to settle some minor points as to their behavior, particularly as to the cause of the peculiar trembling motion of the wings which has been attributed by one or two authors to fear alone.

A bird under close observation flew down to feed on the drupes of a small Olapa (*Cheirodendron*). After a few moments it flew up into a nearby tree, when after deliberately cleaning its bill it broke forth into its fullest song. Pausing as if to study the effect, or to see if the melody would be taken up by its neighbors, it would tremble the wings and hop idly about from branch to branch. This program was repeated many times, singing, feeding, and fluttering its wings alternatively. It is true that the quivering is more often resorted to under the stress of excitement, but it is equally certain that it is indulged in at other times quite naturally and frequently.

As to the song of the Olomao little can be added to the excellent accounts already in print. No one is able to see the singer or hear its song without being impressed by its thrush-like character. The effort is more usually delivered from the topmost branches of some favorite tree; although it is to be found frequently singing joyously in the underbrush. When singing the head is always thrown well back, the throat full and free, and the wings and tail are invariably relaxed and drooping. The irregular, at times, somewhat jerky, though always melodious song is given not once or twice, but often dozens of times. Once heard its character will live in the memory for years, though its component parts are wholly inimitable.

Not only does the Olomao sing early and late, but in fine weather I have heard it far into the night. One of the peculiarities of the song is its ventriloquistic character. A bird may be singing volubly in a tree not twenty yards away, and so varied in volume and timbre are the notes as the song increases from its beginning of a few low chirping notes to the zenith of its power and beauty, that even an experienced observer is at times at a loss to locate the songster. In truth it seems that the whole tree might be full of song. The voice comes from the centre, from the right, from the left, from the back and from the top of the tree successively or simultaneously, seemingly at the pleasure of the musician. So marked is this power that a bird in plain sight may sing a half dozen times before the sombre-colored piper will be discovered. In addition to the song the Olomao has a number of notes and



NEST OF PHÆORNIS RUTHA. (4710)

calls. One which is very puzzling, especially to the natives, is a cat-like cry which is given in an inquiring intonation from some hiding place in the undergrowth.

The species was more abundant at Halawa than at any of the other localities visited. This was doubtless due to the seclusion afforded by the untrodden forests of that section. A few immature birds were taken, but the majority of those seen were in the fully adult plumage. The length of time required for the young to acquire the adult plumage is apparently more than one year.

On May 1 I took from thirty feet up in an Ohia tree growing in the dense woods on the summit of Puualu, a nest which I have no hesitancy in referring to this species. In the locality was a pair of resident Olomao, evidently the owners of the nest (Mus. No. 4710) here described. Externally it is over 6.00 inches in diameter by 3.50 inches deep. Small dead Ohia twigs form the foundation of the structure. Into this is placed a generous lining of moss and fine rootlets neatly woven together to form a substantial thrush-like nest. The hollow of the nest is 3.50 inches across by 1.50 inches in depth. The nest has evidently been used and deserted, though unmistakably of recent construction. It is singular that as yet nothing is known of the egg of any of the species of the genus, save the reference by Henshaw (Birds of the Hawaiian Islands, p. 31) to the finding of a small fragment of an egg shell in the stomach of a Hawaiian Hawk (*Buteo solitarius*) which he suggests might be a portion of an egg of *Phæornis obscura* of Hawaii.

It seems worth while recording that an old native who accompanied me on my Moanui trip said that he had heard from his father "that a long time ago there was on Molokai a small brown bird that ran on the ground but could not fly," but that they had all been dead for a long time. He gave its name as Moho (*Pennula*). He also said that his father had told him of the Elepaio (*Chasiempis*) being on Molokai in the olden time. Mr. Theodore Meyer substantiated this report by saing that when he was a boy it was generally known to the old natives that both the Moho and Elepaio had been plentiful, but that they had long ago died out.

Publications of the Bernice Pauahi Bishop Museum

All previous price lists are hereby cancelled.

A Handbook for the Bishop Museum. Oblong octavo, 94 half-tone illustrations. Price 25 cts., postage 9 cts.

Occasional Papers, Vol. I. Octavo.

No. 1. Director's Report, 1898. Visits to Ethnological museums in a journey around the world. [Out of print.]

No. 2. Director's Annual Report, 1899. Mat Sails of the Pacific—Stokes. Ray-skin Rasps—Walcott. Notes on the Birds of Oahu—Seale. Price 50 cts., postage 4 cts.

No. 3. Director's Annual Report, 1900. Visit to the American museums—Stokes. Mission to Guam—Seale. Notes on the Birds of Kauai—Bryan and Seale. Price $1.00, postage 8 cts.

No. 4. New Hawaiian Fishes—Seale. Price 5 cents; postage 2 cts.

No. 5. Director's Annual Report, 1901, and Index to Vol. I. Illustrations of sperm whale and bird groups. Price 50 cts., postage 4 cts.

Occasional Papers, Vol. II.

No. 1. Director's Annual Report, 1902. Noteworthy Hawaiian Stone Implements—Brigham. Fibres of the Hawaiian Islands—Blackman. Distribution and Variation of Achatinella multizonata—Cooke. Monograph of Marcus Island—Bryan. Price $1.00, postage 7 cts.

No. 2. Director's Annual Report, 1903. Remarks on Phallic Stones from Rapanui—J. L. Young. Aboriginal Wooden Weapons of Australia—Blackman. Price 50 cts., postage 4 cts.

No. 3. Director's Annual Report, 1904. Australian Bark Canoe—Brigham. A Stone Dagger for Duelling—Brigham. Notes on the Birds of the Waianae Mountains—Bryan. Additional Notes on the Nesting Habits of the Hawaiian Owl—Bryan. Description of the Nest and Eggs of Chlorodrepanis virens Gmel.—Bryan. Notes on the American Birds Collected in the Hawaiian Islands by Mr. Gerrit Wilder—Bryan. A Bird's Nest of Pele's Hair—Bryan. Two Undescribed Nests and an Egg of a Hawaiian Bird—Bryan. Price 50 cts., postage 5 cts.

No. 4. Director's Annual Report, 1905. Three New Hawaiian Fishes—Bryan. Report of a Visit to Midway Island—Bryan. Nest of Hawaiian Hawk—Bryan. Price 50 cts., postage 4 cts.

No. 5. Director's Annual Report, 1906, and Index to Vol. II. Dr. Cooke's Report on Types of Hawaiian Land Shells. Price 20 cts., postage 2 cts.

Occasional Papers, Vol. III.

No. 1. Reprint of Original Descriptions of Achatinella. By E. W. Thwing. Price $1.50, postage 9 cts.

No. 2. Notes on Hawaiian Land Shells—Pilsbry and Cooke. Price 25 cts., postage 2 cts.

Occasional Papers, Vol. IV.

No. 1. Fishes of the South Pacific—Seale. Price $1.00, postage 5 cts.

No. 2. Director's Annual Report, 1907. Casts of Hawaiian Fishes, made by John W. Thompson. Stone Sculpturings in Relief—Stokes. Some Birds of Molokai—Bryan. Price 75 cts., postage 5 cts.

Memoirs, Vol. I. Quarto.

No. 1. Hawaiian Feather Work. By Wm. T. Brigham. Price $2.50 postage 14 cts.

No. 2. Index to the Islands of the Pacific. By Wm. T. Brigham. Price $1.50, postage 20 cts.

No. 3. Key to the Birds of the Hawaiian Group. By Wm. Alanson Bryan. Price $1.50, postage 13 cts.

No. 4. Ancient Hawaiian Stone Implements. By Wm. T. Brigham. Price $2.50, postage 20 cts.

No. 5. Supplement to Hawaiian Feather Work, with Index to Vol. I. By Wm. T. Brigham. Price 75 cts., postage 8 cts.

Memoirs, Vol. II.

No. 1. Hawaiian Mat and Basket Weaving—Brigham. Hawaiian Nets and Nettings—Stokes. Price $3.00, postage 20 cts.

No. 2. Old Hawaiian Carvings—Brigham. Price 50 cts., postage 5 c.

No. 3. The Ancient Hawaiian House. By Wm. T. Brigham. Price $3.00, postage 25 c.

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OCCASIONAL PAPERS

OF THE

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Vol. IV.—No. 3.

Director's Report for 1908.

HONOLULU, H. I.
Bishop Museum Press.
1909

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TO THE TRUSTEES OF THE BERNICE PAUAHI BISHOP MUSEUM.

Sirs:—In accordance with the standing vote of the Trustees, I submit my Annual Report on the present condition of this Museum and the general course of work done in the departments during the year 1908.

WILLIAM T. BRIGHAM,
Director of the Museum.

Honolulu, May 1, 1909.
Ordered printed July 9, 1909.

REPORT

THE year 1908 has been memorable for the retirement of the President of the Museum Trustees, Honorable Sanford B. Dole, from the Board, to the sincere regret of every member of the Museum staff and, it may be added with truth, of all who take genuine interest in this Museum, for long before Mr. Bishop decided to found the Memorial which bears the honored name of his wife, Mr. Dole was keen in the belief that such a museum was needed. His correspondence with me at that time was full of interest, and when the foundation was decided upon, Mr. Dole urged the selection of a site in town, preferably the old estate of Paki where Mr. and Mrs. Bishop long made their home a most hospitable centre.

When the charge of the young museum was transferred from the Trustees of the Bernice Pauahi Bishop Trust to a new board consisting of these gentlemen and two especial representatives of the Museum, Mr. Dole, then President of the Republic of Hawaii, was first named for the position by Mr. Bishop, and from that time, as president of the new board, he has shown his great interest in the affairs of the institution and by this interest has greatly encouraged all who were striving for the success of the Bernice Pauahi Bishop Museum in its appointed field.

Mr. Charles Noyes Forbes of the University of California, warmly recommended to me by Professor Setchell, has been appointed Assistant in Botany and he has taken hold of his work with skill and energy since his arrival on June 15th. With the Director he visited the Kilauea region in August and made a valuable collection of the plants found there, and he has since explored the ranges and valleys in the vicinity of Honolulu, extending his trips to a camp on the mountains above Punaluu and the heights of Kaala above Waianae. By his abundant collections we have been able to inaugurate the long promised exchange with the Botanical Garden at Sydney, N. S. W., and the specimens already received in the course of exchange from Australia have been very satisfactory. We hope soon to extend our exchanges to New Zealand and Fiji. In his work on the Hawaiian Flora he has described several new species of considerable interest and his descriptions are appended to this Report. We hope to be able to offer for publication in the Memoirs a decade of little known, poorly described or unfigured Hawaiian plants of interest, of many of which we have secured satisfactory photographs: the series to be continued from time to time as material accumulates.

While the general activities of the Museum have continued to be limited by the absence of any sufficient room for work or storage, those energies not so dependent on the Museum Laboratories have progressed satisfactorily. Mr. J. F. G. Stokes, the Curator of Polynesian Ethnology, has been able to incorporate with the general collection the Deverill collection referred to in the last annual Report as purchased for the Museum, and a summary catalogue of the same is appended to this Report. In his investigations of Hawaiian antiquities he, in common with all who have been compelled to use the valuable work of Fornander on the Polynesian Race, found great annoyance and unnecessary labor from the absence of an index to that work which is filled with information unskilfully arranged and with no key. To make the path easier for future students Mr. Stokes has prepared a most elaborate index extending to eighty-six pages as printed in double columns, and the Trustees have authorized its printing as an extra volume not in our exchange series. The edition is limited to two hundred and fifty copies. Dr. W. D. Alexander, always a friend to this Museum, has written a biographical sketch of Fornander and has warmly commended the volume.

The Curator has also made study of the interesting so-called "shark-pens" near the mouth of Pearl Harbor, which the military authorities of the United States must destroy in the improvement of the harbor, and his results are given with this Report.

Dr. Cooke has continued his laborious collection and examination of the minute forms of Hawaiian Pulmonata, and has also been engaged in cataloguing the important collection of the late M. Ancey, now belonging to this Museum. Mr. J. W. Thompson has added many casts of fishes, fruits and also of stone implements borrowed for this purpose, and these have been excellently colored to correspond with the originals.

A work which enlisted all the forces of the Museum was the removal of all the collections in Hawaiian Hall from the cases to permit the repainting of the iron racks and brackets. These had originally been coated with a bituminous paint which the terebinthine exhalation from the white cedar with which the cases are lined dissolved and made intolerably sticky. This was entirely removed from the many hundreds of brackets and racks, which were repainted with a more suitable material. The removal of specimens and shelves from sixty-two large cases required great care as well as labor, but it is hoped such a removal will not again be needed for a similar cause.

The Director's visit to Kilauea in August and September enabled him to complete his notes on the history of that volcano, on which he has for some time been engaged, and this having been accepted by the Trustees is now passing through the press, and it is hoped will be issued in 1909. The extent of this paper (which will complete volume II of the Memoirs), and the number of the illustrations have delayed the publication, but it is intended to convey to those who have never visited these Islands some adequate idea of the appearance and activities of this most wonderful and accessible volcano: and recall to those who have been fortunate enough to witness its eruptions, the memorable "Pit of Pele" and the outflow of molten rivers from Mauna Loa and Kilauea.

Much work has also been done in the preparation of a volume on Kapa or Bark-cloth, or more properly paper, primarily of these Islands but also including the similar work of other Polynesians and extending through Africa, the East Indies and other countries where this primitive manufacture was once all-important but now everywhere disappearing before the cheaper and more durable product of the loom. With the view of preserving at least the memory of this fast vanishing product of early ingenuity the Trustees of this Museum have made generous provision for illustrating in *fac simile* scores of beautiful or interesting colored specimens from the combined collections of this Museum and of the Director, and these plates are now in the hands of the most competent workmen. It is hoped that the result may be published in the course of 1910.

TABLE OF ATTENDANCE.

1908.	Whites.	Hawaiians.	Portuguese.	Chinese.	Japanese.	Others.	Open on		Visitors on closed days.	Average Attendance.		Total Visitors.
							Public days.	Other days.		Public days.	Other days.	
January	300	140	39	53	239	28	10	3	35	75	12	799
February	478	235	46	249	184	18	9	3	26	132	9	1210
March	401	90	7	135	176	12	8	3	59	95	20	821
April	442	194	22	96	122	11	8	6	119	96	20	887
May	369	139	44	99	135	35	9	3	41	87	14	821
June	311	96	62	66	136	30	9	5	63	71	13	701
July	568	98	65	97	195	16	12	5	40	83	8	1039
August	324	74	43	81	172	31	9	7	55	74	8	725
September	408	104	30	108	164	24	9	2	7	92	4	838
October	385	108	40	87	177	14	10	6	80	73	13	811
November	241	104	37	87	104	14	8	4	24	70	6	587
December	245	82	17	50	63	10	7	4	12	65	3	467
Totals	4472	1464	452	1208	1867	243	108	51	561	84.6	11.	9706

List of Accessions.

DEPARTMENT OF ETHNOLOGY.

Collection of the late W. E. H. Deverill of Kauai, purchased and presented by the Charles R. Bishop Trust. Specimens collected in Hawaiian Islands except where otherwise mentioned.

9192–9216	Umeke.
9217–9220	Pa.
9221	Pa ia.
9222	Ipu kuha.
9223–9244	Squid sinkers.
9245–9247	Squid hooks.
9248–9250	Stone mirrors.
9251–9252	Polishing stones.
9253–9256	Olona scrapers, of pearl shell.
9257–9259	Kapuahi kuni anaana.
9260	Noa stone.
9261	Kikeula.
9262	Stone end of club.
9263–9265	Adz handles.
9266	Laau melomelo.
9267	Lei palaoa.
9268	38 Bambu kapa markers.
9269	Stone fish god.
9270	Piikoi.
9271–9274	Music sticks.
9275	6 Net menders.
9276–9279	Netting needles.
9280–9281	Spacers.
9282	Tobacco pipe.
9283	Supply of shark's teeth.
9284–9285	Huewai pawehe.

9286	Hinai poepoe.
9287–9289	Hula drums.
9290	½ Ipu uhane.
9291–9295	Koko puupuu.
9296–9308	Kapa moe, malo, kihei, etc.
9309	Uluna.
9310–9313	Awa cups.
9314–9333	Adzes.
9334–9335	Hammers.
9336–9337	Flat stone dishes.
9338	Sculptured stone lamp.
9339–9343	Stone lamps.
9344	Poho kui palu.
9345–9350	Poi pounders, common form.
9351–9354	" ring form.
9355–9357	" stirrup form.
9358–9360	Pestles.
9361–9372	Ulumaika, disk form.
9373	" spherical form.
9374–9408	Kapa mallets.
9409	Kapa anvil.
9410	" for malo.
9411–9413	Olona boards.
9414–9417	Spears.
9418–9419	Wood carving tools.
9420–9421	Niho palaoa.
9422	Ivory bead necklace.
9423–9426	Ivory bead bracelets.
9427	Ivory bead.
9428	Tobacco pipe.
9429	Ipu hokiokio.
9430–9435	Fish hooks of pearl, for trolling.
9436	" tortoise shell.
9437	" ivory.
9438	" coconut shell.
9439–9443	" pearl shell.
9444–9449	" tortoise shell.
9450–9451	" pearl and tortoise shell.
9452–9456	" human bone.

9457–9458	Files.
9466–9467	Pa puaa.
9468	Laau lomilomi, of Kaumualii.
9469	Kapa mallet.
9470	Spear, broken.
9471–9473	Awa cups.
9474	Gourd cup.
9475	Auamo.
9476–9479	Net menders.
9480	Iron fish hook.
9481	Olona.
9482	Ulili.
9483	White kapa.
9484–9489	Shells.
9490–9493	Koko.
9494–9496	Poi pounders, ring and stirrup forms.
9497–9506	Squid sinkers.
9507	Stone hammer.
9508	Stone head of club.
9509–9512	Adzes.
9513–9514	Pestles.
9515	Mortar.
9516	Crab shell.
9517	Turtle skull.
9518	Piece of drift wood (? idol).
9459	Ivory charm. Alaska.
9460	Wooden fish hook. Ellice Islands(?).
9461	Stone dish. Nihoa.
9462	Implement of coral rock; possibly for scaling fish. Nihoa.
9463	Implement of coral rock. Nihoa.
9464	Tapa. Samoa.
9465	Spear. Society Islands.

Gifts.

9653	Stick made from coffee wood. Given by Mr. A. F. Judd.
9654	Dancing wand. Given by the Hawaiian Board of Missions.
9655	Dancing mask. New Hebrides. Given by Mr. L. A. Thurston.

9656–9657	Kapa. Hawaiian Ids. Given by Mrs. W. R. Castle.
9658–9659	Kapa mallet. Hawaiian Ids. Id.
9660	Koko puupuu. Hawaiian Ids. Id.
9661	Roll of human hair braid. Hawaiian Ids. Id.
9662	Squid hook. Hawaiian Ids. Id.
9663	Pala i e (cup and ball). Hawaiian Ids. Id.
9664	Tail feathers of Phaëthon rubricanda. Id.
9665–9666	Stone implements. Hawaiian Ids. Id.
9667	Fillet. Micronesia. Id.
9668	Stone for trapping birds. Hawaiian Ids. Given by Mr. E. S. Cunha.
9669	Stone idol. Hawaii. Given by Mr. Jared G. Smith.
9077–9080	Bundles of bones. Hawaiian Ids.
9081	Mummified baby. Hawaiian Ids.
9530	Umeke. *Purchased.*

DEPARTMENT OF CONCHOLOGY.

Number of shells collected and sent to the Museum for identification	26,392
Number of shells purchased (Ancey collection)	14,018
Total	40,410

The number of new catalogue numbers added was 2810.

Shells have been received from Messrs. I. Spalding, E. Davis, C. S. Dole, C. A. Rice, A. F. Judd, A. F. Knudsen, F. R. Greenwell, H. Podmore, D. D. Baldwin, P. Deverill, D. Thaanum, J. F. G. Stokes, G. Fuller, L. Wishard, O. H. Swezey and C. N. Forbes.

ADDITIONS TO THE LIBRARY.

Accessions denoted by an * were acquired by exchange.

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*American Philosophical Society.—Transactions, xxi, 5.—Proceedings, 186-189.

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*Anthropologie de Paris, Revue de l'École d'.—Dix-Septième Année, 3-12.

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Boston, Mass.—Boston Public Library.
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Calcutta, India.—Asiatic Society of Bengal.
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Capetown, S. Africa.—South African Museum.
Chicago, Ill.—Field Museum.
Christchurch, N. Z.—Canterbury Museum.
Cologne, Germany.—Rautenstrauch-Joest Museum.
Copenhagen, Denmark.—Société Royale des Antiquaires du Nord.
Dresden, Germany.—Königl. Zoologisches und Anthropologisch-Ethnographisches Museum.
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Edinburgh, Scotland.—Royal Society of Edinburgh.
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Geelong, Vic.—Gordon Technical College.
Genoa, Italy.—Museo Civico di Storia Naturale di Genoa.
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Hanover, N. H.—Dartmouth College.
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  Oahu College.
  United States Experiment Station.
Lawrence, Kansas.—University of Kansas.
Leiden, Holland.—Rijks Ethnographisches Museum.
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Leipzig, Germany.—Städtisches Museum für Völkerkunde zu Leipzig.
Liverpool, England.—Liverpool School of Tropical Medicine.
London, England.—Linnean Society of London.
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Madras, India.—Madras Government Museum.
Manila, P. I.—Bureau of Science.
  Ethnological Survey.
Melbourne, Vic.—Royal Society of Victoria.
Mexico.—Mexico Instituto Geologico.
Munich, Germany.—Königl. Ethnographisches Museum.
Natal, S. Africa.—Natal Government Museum.
New Haven, Ct.—Connecticut Academy of Arts and Sciences.
  Yale University Library.
New Plymouth, N. Z.—Polynesian Society.
New York, N. Y.—American Museum of Natural History.
  Columbia University Library.
  New York Botanical Garden.
Oberlin. O.—Oberlin College.
Para, Brazil.—Museu Goeldi.
Paris, France.—École d'Anthropologie de Paris.
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Philadelphia, Pa.—Academy of Natural Sciences of Philadelphia.
  American Philosophical Society.
  Free Museum of Science and Art.
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Pittsburg, Pa.—Carnegie Museum.
Plymouth, England.—Marine Biological Association of the United Kingdom.
Rome, Italy.—Reale Accademia dei Lincei.
Salem, Mass.—Peabody Academy of Science.
San Francisco, Cal.—California Academy of Sciences.
Sâo Paulo, Brazil.—Museu Paulista.
St. Louis, Mo.—Missouri Botanical Garden.
Stanford University, Cal.—Leland Stanford Junior University.
Stockholm, Sweden.—Kongl. Vitterhets Historie och Antiqvitets Akademien.
Sydney, N. S. W.—Australian Museum.
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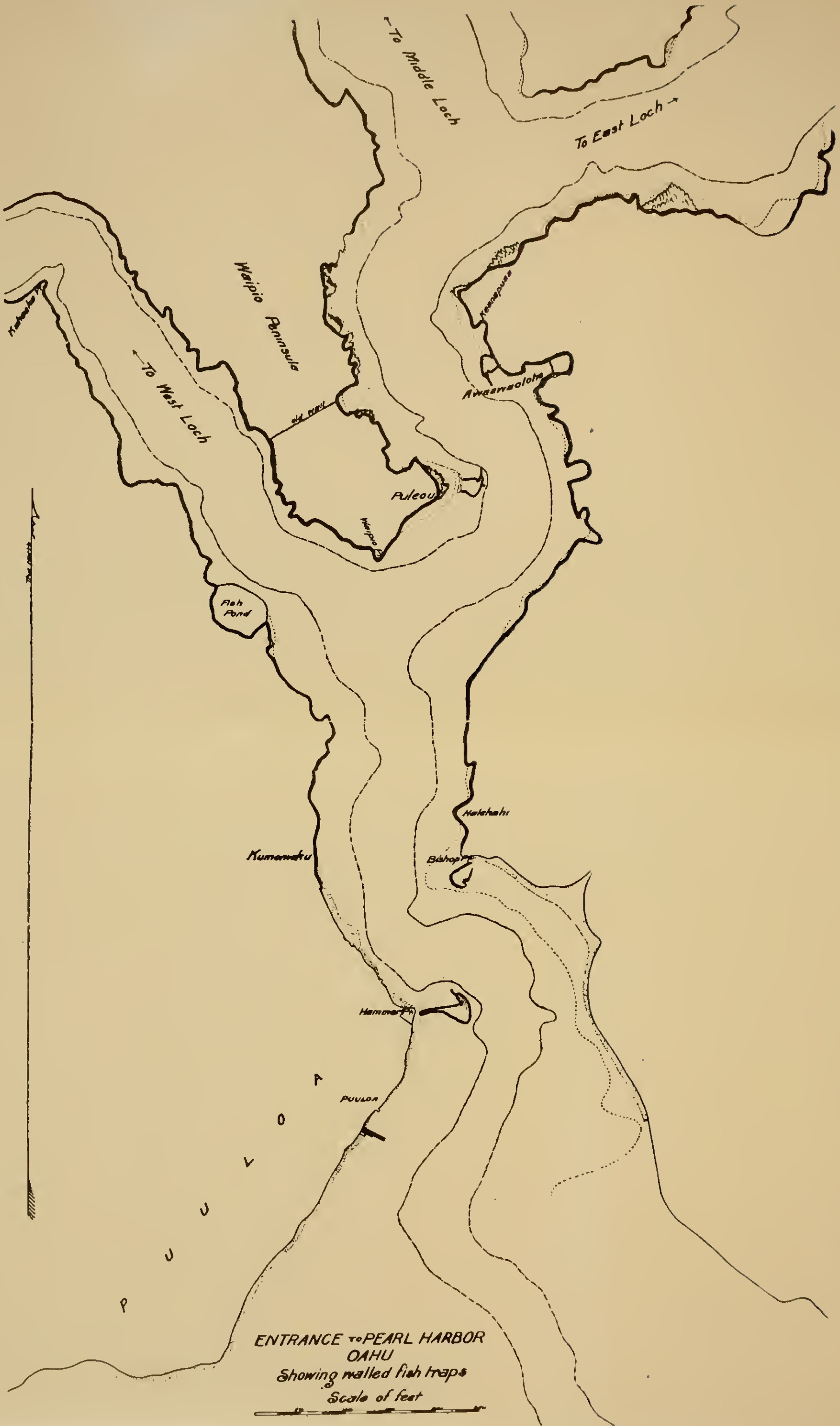
←To Middle Loch
To East Loch→
Waipio Peninsula
←To West Loch
Keanapuaa
Awaawaoloa
old wall
Puleou
Waipio
Fish Pond
Halehahi
Bishop Pt.
Kumumatu
Hammer Pt.
Puuloa
PUUOA
ENTRANCE TO PEARL HARBOR
OAHU
Showing walled fish traps
Scale of feet

MAP OF THE ENTRANCE TO PEARL HARBOR, SHOWING POSITION OF FISH TRAPS.

Walled Fish Traps of Pearl Harbor.

By John F. G. Stokes.

Among the few remaining evidences of early Hawaiian life are the walled fish traps, pounds or weirs at the entrance to Pearl Harbor, Oahu. They are particularly interesting as not occurring elsewhere in the group, probably for the reason that conditions favorable to their operation are only to be found at this one place.

The Hawaiians have had for many years a system of raising fish for food within ponds and walled enclosures, called *loko*, adjacent to the sea, the varieties being confined to such shore fishes as *amaama* (*Mugil cephalus* Linnæus), and *awa* (*Chanos chanos* Forskål), and an occasional *moi* (*Polydactylus sexfilis* Cuv. & Val.), *kaku* (*Sphyræna snodgrassi* Jenkins), or *oopuhue* (*Tetraodon* sp.) which may have entered the pond when young. The system is still in use in all the islands, more particularly on Molokai[1] and Oahu, and has already been referred to by Dr. J. N. Cobb.[2] There was also a method of taking fish in weirs in the mountain torrents, in which the stream was dammed with a transverse wall just above the rapids and conducted by means of a canal over a horizontal sieve of long slender sticks lying parallel and close together. During floods, when the waters of the stream were rendered muddy, great quantities of *oopu* (fresh water gobies) were caught in these weirs.

The Pearl Harbor fish traps on the other hand were used for the purpose of taking the ocean fishes which had entered the harbor, the principal being the *akule* (*Trachurops crumenophthalma* Bloch), *oio* (*Albula vulpes* Linnæus), *weke* (*Mulloides* and *Pseudupeneus* sp.), and *pualu* (*Hepatus guntheri* Jenkins), and the *makiawa* (*Etrumeus micropus* Schlegel). Occasionally other fishes were taken in small numbers such as *kawakawa* and *aku* (*Gymnosarda* sp.), *opelu* (*Decapterus pinnulatus* Eyd. & Soul.), sharks—in fact

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[1] On this island, use was made of very large ponds, in the walls of which were numerous entrances and exits—the fish being netted while attempting to pass through. It is hoped to illustrate these structures at a later date.

[2] U. S. Fish Commission Bulletin, vol. xxiii, pt. 2, p. 746.

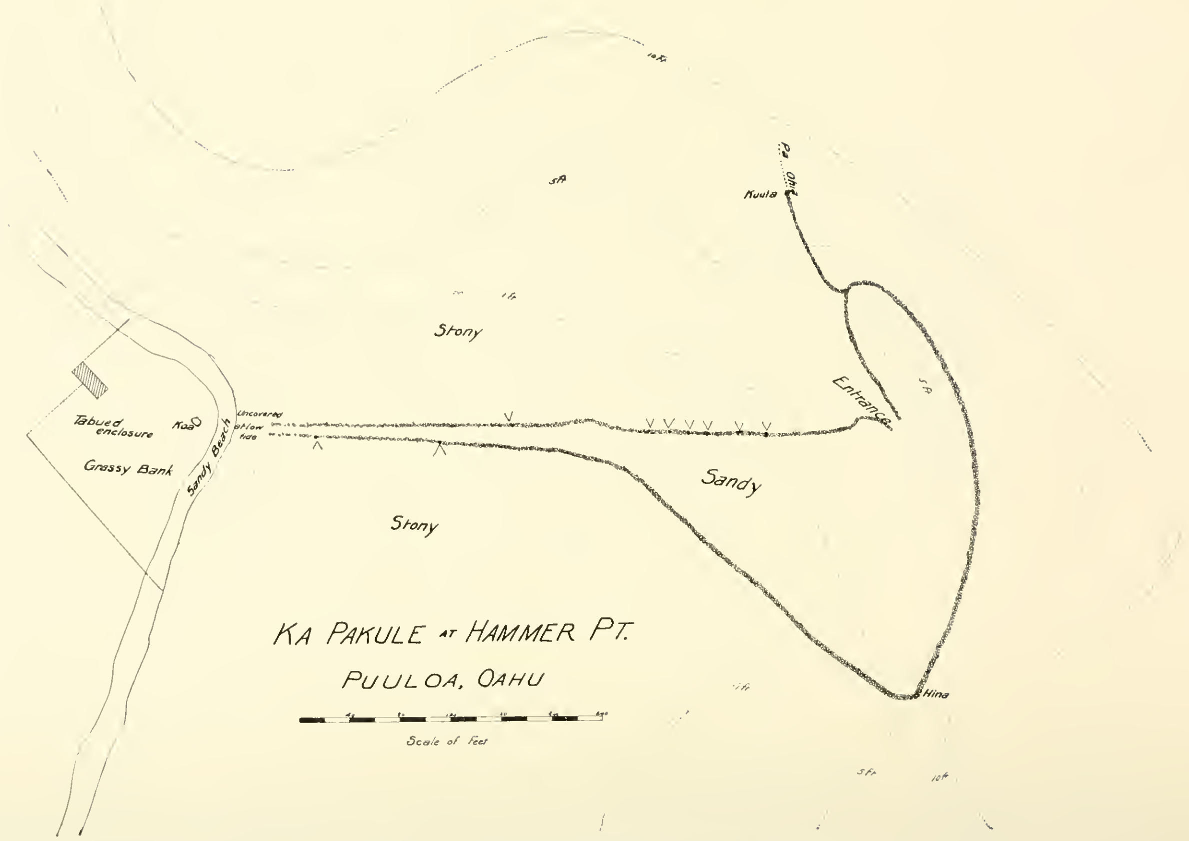
10 ft
5 ft
Pa Ohia
Kuula
1 ft
Stony
Entrance
5 ft
Tabued enclosure
Koa
Uncovered at low tide
Sandy Beach
Grassy Bank
Sandy
Stony
KA PAKULE AT HAMMER PT.
PUULOA, OAHU
Scale of Feet
1 ft
Hina
5 ft
10 ft

FIG. 1. PLAN OF PAKULE AT HAMMER POINT.

one trap known as *Pakule* is claimed by older Hawaiians to have been entered by every fish except the whale(!) and to have retained every kind except the amaama, which latter could find its way out over the walls.

Three traps now remain, the largest called "Pakule" (originally without doubt *Pa akule*, the akule pen, since the akule was the most important fish taken therein) on the west bank of the channel at Hammer Point. In this trap (Fig. 1) were caught all the fishes just mentioned except the makiawa. In modern times sharks have been captured within its confines, and it now goes by the name of "The Shark Pen" among the white residents. The other two traps (Figs. 2 and 3) are called "Pa makiawa" and are situated, one on the west of the channel at the point called Puleou and now sometimes misnamed Pookala (which was formerly the name for Waipio Point), and the other on the east of the channel between the place called Keanapuaa and Awaawaolohe bay. In these the makiawa was taken. Formerly there was another trap on the east bank of the channel at Bishop Point, which has been in ruins as far back as any modern native can remember; it has been removed and the stones used to build a small pier near the point. From descriptions it has been gathered that the shape, position and use were the same as the pa makiawa at Keanapuaa.

The general shape of the three fish traps is alike. A heavy curved wall following generally the direction of the shore was built in the deeper water, and, turning back for about one-third of the distance, formed a pocket and acted as one side of the entrance. From the turn another wall ran out to deep water as a leader. From the shore side of the entrance a wall was constructed, first parallel with and then directly to the shore, diminishing in size as the water shoaled. The rear end of the outer wall and the beach were joined by another wall. The walls varied in width from a single line of stones near the shore to from three to six feet in the deepest part, and were built of blocks of coral reef rock averaging in size eighteen by fifteen by six inches.

On the walls of the Pakule running shorewards were many pieces of dark basalt and of a curious black indurated mud resembling adobe. At several places along the bank of the channel a stratum of the latter substance crops out between two strata of reef rock, and at Keanapuaa this sedimentary deposit is two feet deep. The basaltic pieces, however, must have been brought from a distance of several miles. Tradition has it that all the stones for the walls were brought from a hill in Ewa, Oahu, called "Puuopalalii" which is of volcanic origin; the earliest account must have related to these few lava rocks. The dark stones were more numerous along the north wall than on the south, and those found in position were about thirteen feet apart. The natives called them "men" who drove back the fish attempting to pass over the wall. When newly laid, the dark stones would have contrasted very strongly with the light color of the coral rock, and undoubtedly fulfilled their purpose then, but when seen, they were so thickly covered with mollusca and barnacles as to be well nigh indistinguishable from the rest. It has been claimed that the dark stones had been worked by hand to resemble sharks' heads, but an examination showed them to have been the result of natural cleavages, and their shape undoubtedly influenced the builders in their selection. The best shaped specimen of each kind of stone

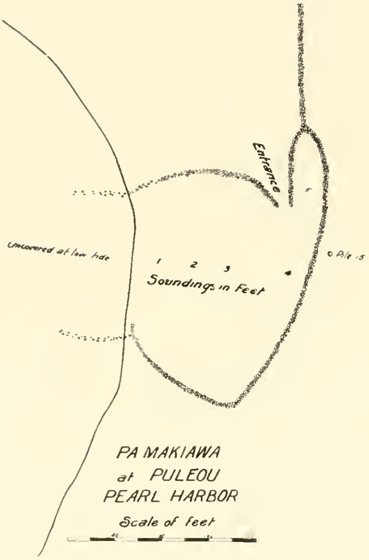
Entrance
Uncovered at low tide
o Pile 15
1 2 3 4
Soundings in Feet
PA MAKIAWA
at PULEOU
PEARL HARBOR
Scale of feet

FIG. 2. PLAN OF PA MAKIAWA AT PULEOU.

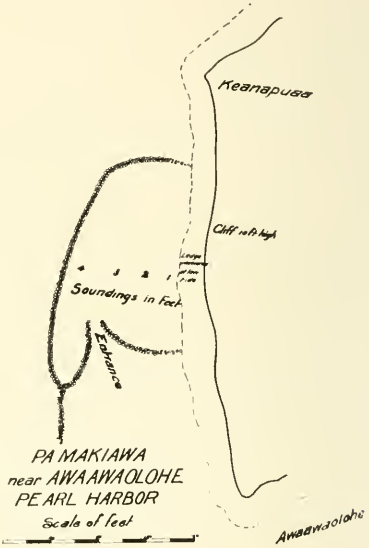
Keanapuaa
Cliff 10 ft high
Ledge
4 3 2 1
Soundings in Feet
Entrance
PA MAKIAWA
near AWAAWAOLOHE
PEARL HARBOR
Scale of feet
Awaawaolohe

FIG. 3. PLAN OF PA MAKIAWA NEAR KEANAPUAA.

is shown in Figs. 4 and 5: A is a piece of indurated mud; C, a layer of the marine growth above mentioned, one and one-eighth inches thick which has fallen from A since its removal from the water, while B is a piece of basalt nineteen inches high. The dark stones are indicated by arrow points in Fig. 1.

At the north end of the leader wall is another dark stone about four and one-half feet long and one foot wide and thick.

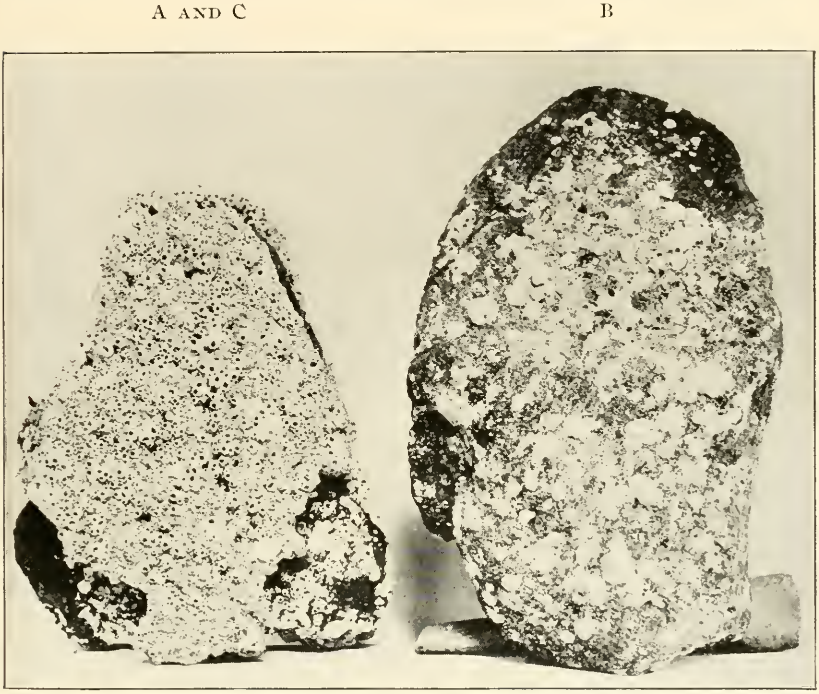

FIG. 4. DARK STONES ON WALLS OF PAKULE.

It was lying on the bottom of the water when seen, but formerly stood erect. Its name was "Kuula," the Hawaiian fish god. Kuula was a noted fisherman in early days, who has since been deified and is still worshipped on all the coasts of these islands in the shape of stones, sculptured and rough, and in small walled enclosures. His wife Hina is sometimes with him, and in the Pakule she is to be found as a roughly pentagonal slab of coral rock about two and one-half by two feet by eight inches in size, and her position is on the south end of the outer wall standing erect and facing the open sea.

Running out into deeper water from Kuula and in the same direction as the leader, there formerly stood a row of twelve *ohia* tree stems about six fathoms high and three feet apart. It was called "Pa Ohia," and some of the trees were seen in place ten years ago. It is probable that the other fish traps were similarly provided.

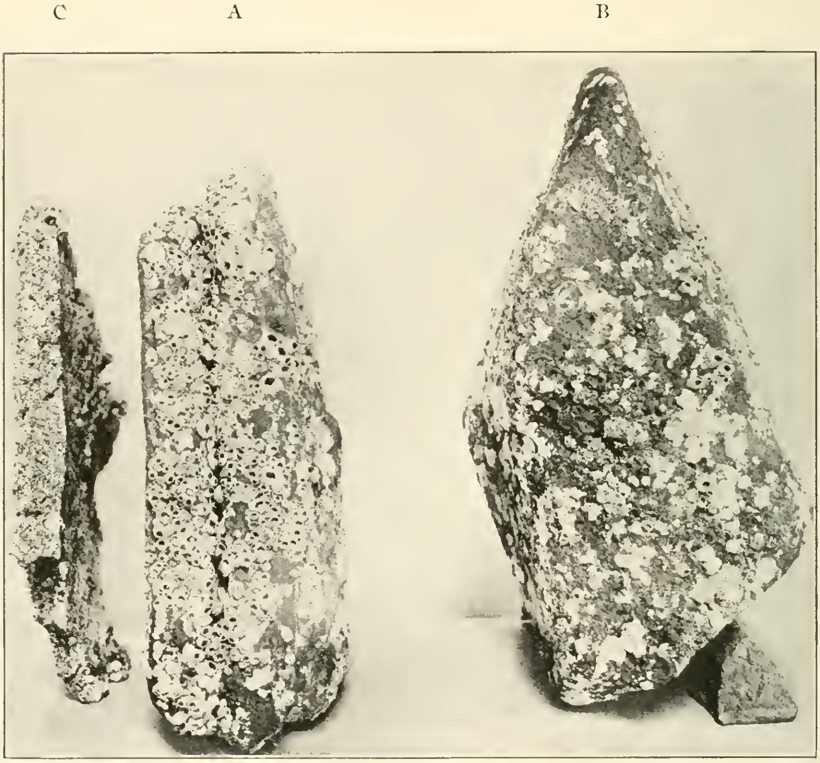

FIG. 5. DARK STONES ON WALLS OF PAKULE.

The walls of the Pakule are approximately nine inches above water at low tide, and the height of the tide averages one and one-half feet. The walls of the two pa makiawa are just covered at low tide, but were probably a little higher, as they are not so well preserved as those of the Pakule. The two former pens, judging from the marine growth, are much older than the latter. On the walls of the pa makiawa at Puleou, no dark stones were observed, but a few were seen on the *outer* wall of that at Keanapuaa, and none on the side walls.

From rough soundings made, it was observed that the corresponding depth of water inside and outside of the fish traps did not appreciably differ. In the plans, the depth at low tide is marked in feet. Some months ago when sections of the north and south walls of the Pakule were removed (as seen in Figs. 7–10) it was found that the stones were lying on top of the sand bank and that conditions were the same as at the time of building. The writer is waiting to watch the removal of the heavier outer wall.

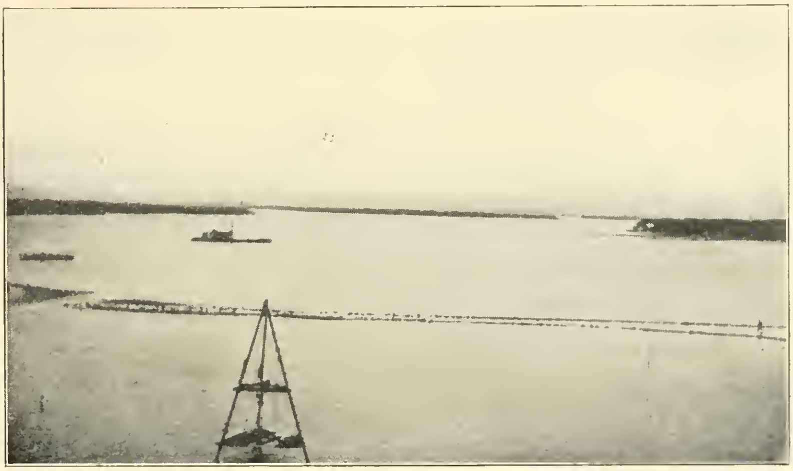

FIG. 6. THE PAKULE, WESTERN HALF.

It is interesting to note what advantage of natural conditions was taken by the early fishermen in constructing their traps on the banks jutting out into the channel. In referring to the map, it should be remembered that the pa makiawa at Bishop Point was merely drawn in from description. The natives say that the incoming tide flows more strongly against the east side of the channel, while the west side bears the heavier proportion of the ebb. To reap the full benefit of this condition, the entrances of the pens were built opposed to the stronger current.

In landing the catch, the shoal was allowed to enter the pen, when the fish, probably finding themselves entrapped, congregated in the deep water of the pocket. Soon, no doubt following the tide, they moved toward the closed side of the pen, when a small seine was drawn across the entrance from a point about the middle of the outer wall and their return to deep water barred. They were then drawn ashore through the shallow water.

The name of the builder of the fish traps has not come down to us, but the natives living thereabout say that the Pakule was built in one night by the Menehune—gnomes—many years ago. The Menehune belief is frequently met with on these islands, and to the constructive ability of these mythical people is attributed today many of the earlier works of the Hawaiians. Ancient Hawaiian history records little more than the genealogies and wars, but Fornander[3] mentions that an enterprising Ewa chief, Keaunui, son of Maweke, about twenty-six generations ago, accomplished the task of widening and deepening the channel of the harbor, which was without doubt no mean undertaking. To such a chief might perhaps be given credit for the ingenuity exercised in building these weirs. The writer is inclined, however, to surmise the

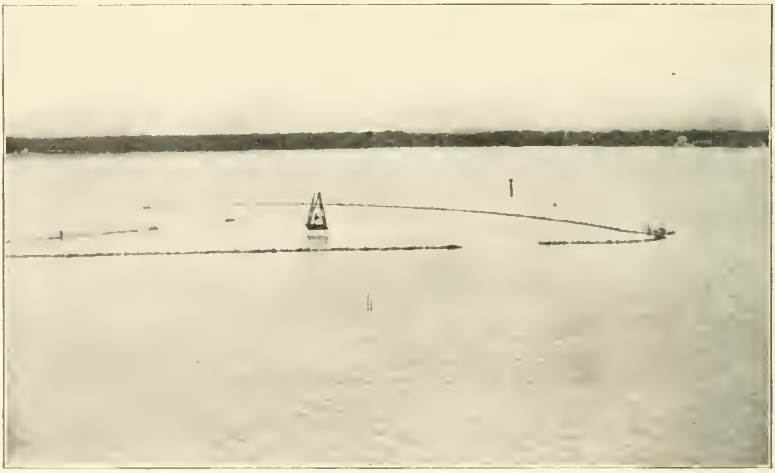

FIG. 7. THE PAKULE, EASTERN HALF.

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[3] Polynesian Race, vol. ii, p. 48.

date as about thirteen generations ago, when the building of the walled fish ponds must have been sufficiently novel to the native chronicler for the fact to be recorded. Then it was that Kalaimanuia,[4] queen of Oahu, was accredited with the building of three fish ponds in Pearl Harbor, *Kapaakea* in Waimalu, and *Opu* and *Paaiau* in Kalauao, and her son Kaihikapu is mentioned as constructing two more in Moanalua near by. As to whether the fish ponds or the fish traps took precedence in time in these islands is an open question. Under ordinary circumstances it might easily be conceived how fishermen observing the assistance given by a natural wall or bank in the water and channels in the reefs, when surrounding their prey, would construct artificial walls to assist in driving the fish, and the walled fish trap as here illustrated might follow as a natural development. Ethnology teaches us that the rearing of animals denotes a higher civilization than the hunting of the same, and it is reasonable to admit that the growing of fish in the ponds and their conservation for future needs is an advance on the method of capturing supplies to fill immediate demands.

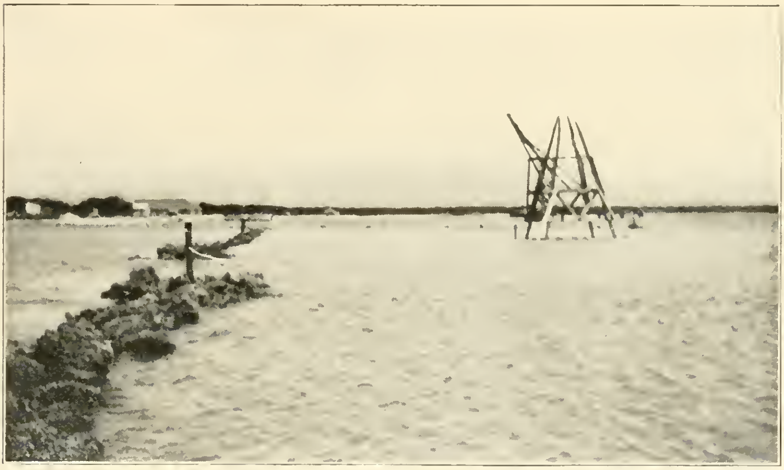

FIG. 8. SOUTH WALL OF PAKULE, LOOKING WEST.

The original fish pond was probably a fish trap in which a larger supply than needed was taken at one time and the fish retained therein until used. This advantage of a supply on hand might well have suggested the enlargement and alteration of the shape of fish traps for use as fish ponds, the present simple walled structure constituting the latter, being the natural result of economy of labor. However, this explanation drawn from local conditions can hardly be taken as a guide to priority of age of the fish traps now remaining at Pearl Harbor in comparison with the fish ponds of these islands, as both are well developed forms fully adapted for their respective uses, and existed in full operation at the same time side by side. It is not improbable that they owe their origin to a time prior to the advent of the Polynesians to these islands, and it would be interesting to observe what advances in these directions the southern Polynesians had made. The similarity of type of the fish traps at Pearl Harbor seems to indicate a familarity with some previously known form, though they may also have been copied from one original in Pearl Harbor, in which case that on Bishop Point was probably the first, followed in order of time by those at Puleou, Keanapuaa and Hammer Point, judging from the marine growth and condition of the walls.

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[4] Polynesian Race, vol. ii, p. 269.

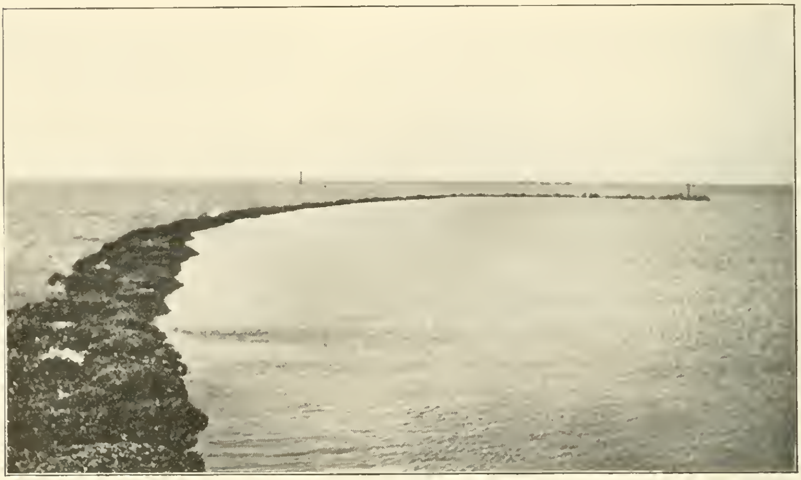


FIG. 9. OUTER WALL OF PAKULE, LOOKING SOUTH.

It is among the fisherfolk that we find superstitions most prevalent today, and many Hawaiian fishermen are still as punctilious in the offerings of "first-fruits" as they were formerly. When a Hawaiian makes a new net, the first object drawn up, be it fish, seaweed or pebble, is offered to Kuula with a prayer to insure the luck of the net. Formerly, and in isolated cases today, the first fish of the catch was brought ashore and dedicated to Kuula, the ceremony as now observed being a simple offering generally accompanied by a prayer and varying according to the locality and the individual.

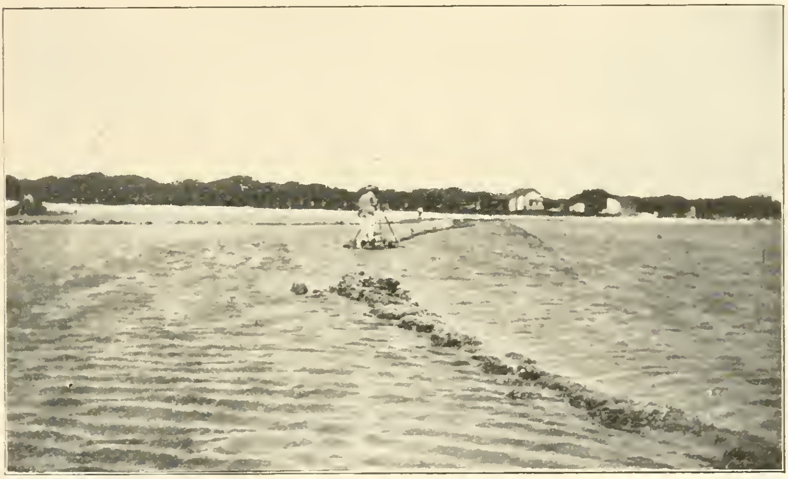


FIG. 10. NORTH WALL OF PAKULE, LOOKING WEST.

At Hammer Point above the beach and in line with the north and south walls of the Pakule is an *imu* or underground oven called "Koa" (Figs. 1 and 11). Koa is the name of a small walled enclosure or platform, numerous examples of which are scattered around the coasts of these islands, where the fish are offered to Kuula. This Museum is fortunate in having in its employ as a janitor a Hawaiian fisherman who lived for many years near Puuloa, and through him most of the native information was gleaned. The Pakule and the land at Hammer Point enclosed by the fence and the house (see Fig. 1) were tabu to Kuula and watched over by his *kahuna* or priest, who lived in the house and drew the fish into the trap by means of invocations to his deity. It would seem that the ceremonies connected with this Pakule were to be stringently observed, as, if a kahuna in his incantations even misplaced a word, the ceremony would be of no effect and the kahuna would die. The priest was believed to have the power to draw into the trap at will any variety of fish desired, and for his services he received payment in advance from the fishermen who expected to benefit from the catch. It was believed that when invoked, Hina enticed the variety of fish desired into the harbor from the sea. On the return of the fish to the ocean, they perceived Kuula hiding behind the wall and fearing to pass him, attempted to make their way over the bank, where they were stopped by the men on the walls (represented by the black stones). Threatened on both sides, they entered the trap. Mr. Bruce Cartwright Jr. found on top of the wall near Hina a collection of four or five small pieces of basalt; the largest, under seven inches long, was preserved and shown to a native, who said it represented a certain fish. It may be that the kahuna, who believed in his power as thoroughly as did his customers, desig-

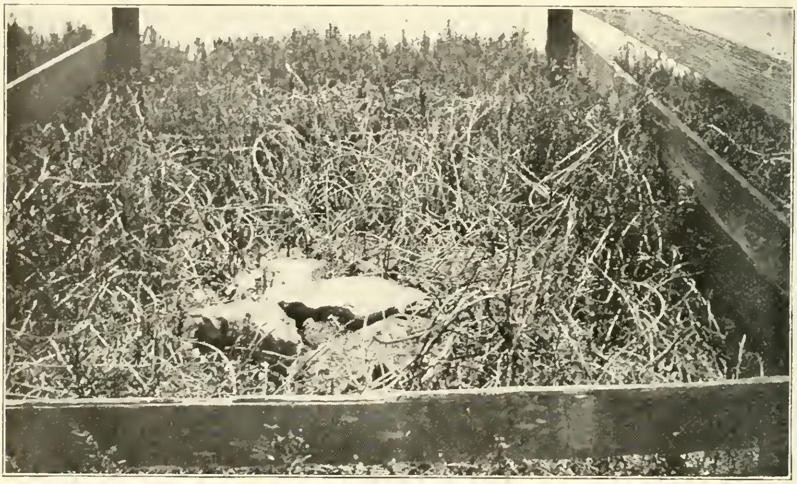


FIG. 11. KOA.

nated to the goddess the variety of fish he prayed for, by means of such stones placed where described.

Piopio is said to have been the kahuna until 1882 or 1883, followed by Kaanaana until 1889. Then Kimona took charge and operated the Pakule until 1891 when he left to live at Moanalua. Several attempts to resuscitate the fishing have since failed, in 1907 no less than three kahunas being called in at different times, and the natives have observed that these three priests have died since their failure, and the man employing them has lost his position!

The janitor was once a participant in a catch of fish, when several fishermen asked the kahuna to call in a certain variety. They were told to return the following morning. On their return, the fish were waiting and while the kahuna uttered his prayers by the heating imu, the fishermen surrounded the shoal; leaving the catch in the water inside the net, they brought one fish—the first—to the kahuna who offered it to Kuula and cooked it in the oven, all the while mumbling his prayers, which the janitor, who was desirous of learning how to do it, could neither hear clearly nor understand. When cooked the fish was partaken of by every one present, and all the remains buried in the oven. Mr. Cartwright has lately informed the writer that there are certain holes in the ledge of rock at Puleou in which, it was said, the fish were cooked, and it is more than probable that similar customs prevailed at the other fish traps, the cessation of the same being due to the overshadowing influence of the larger and better situated Pakule, which is also, as before remarked, probably the most recent.

The walls of the Pakule and the fenced ground have been refered to as tabu to Kuula. Males and unmarried girls were permitted to pass along the walls and through the enclosure, but if any married woman were to trespass in these sacred precincts, a sickness would attend her which would end her life unless cured by Kuula's kahuna. Another version is that both the woman and the kahuna would die. It might be mentioned that from the walls of fish ponds women were debarred during the period of their menses, the belief being that the fish in the pond would become poor and thin, and the consequences to the woman, a serious illness or even death. Any explanation of this and the foregoing beliefs the writer has been unable to obtain.

The janitor had observed that during the incumbency of the various kahuna sharks were never known to have entered the trap, but since the Pakule has been unguarded these fish have often trespassed. An evidence of this is the curious fact that today the Pakule is known to the white population as "The Shark Pen," and the belief is general among others than the aborigines that it was built for the purpose of entrapping sharks.

These walled fish traps, being in the line of the channel planned by the United States naval authorities, will probably cease to exist within the next twelve months.

Some New Hawaiian Plants.

By CHARLES N. FORBES.

April, 1909.

The English system of measurement is retained in the English descriptions to facilitate comparison with descriptions of the Hawaiian plants. The line is one-twelfth of an inch.

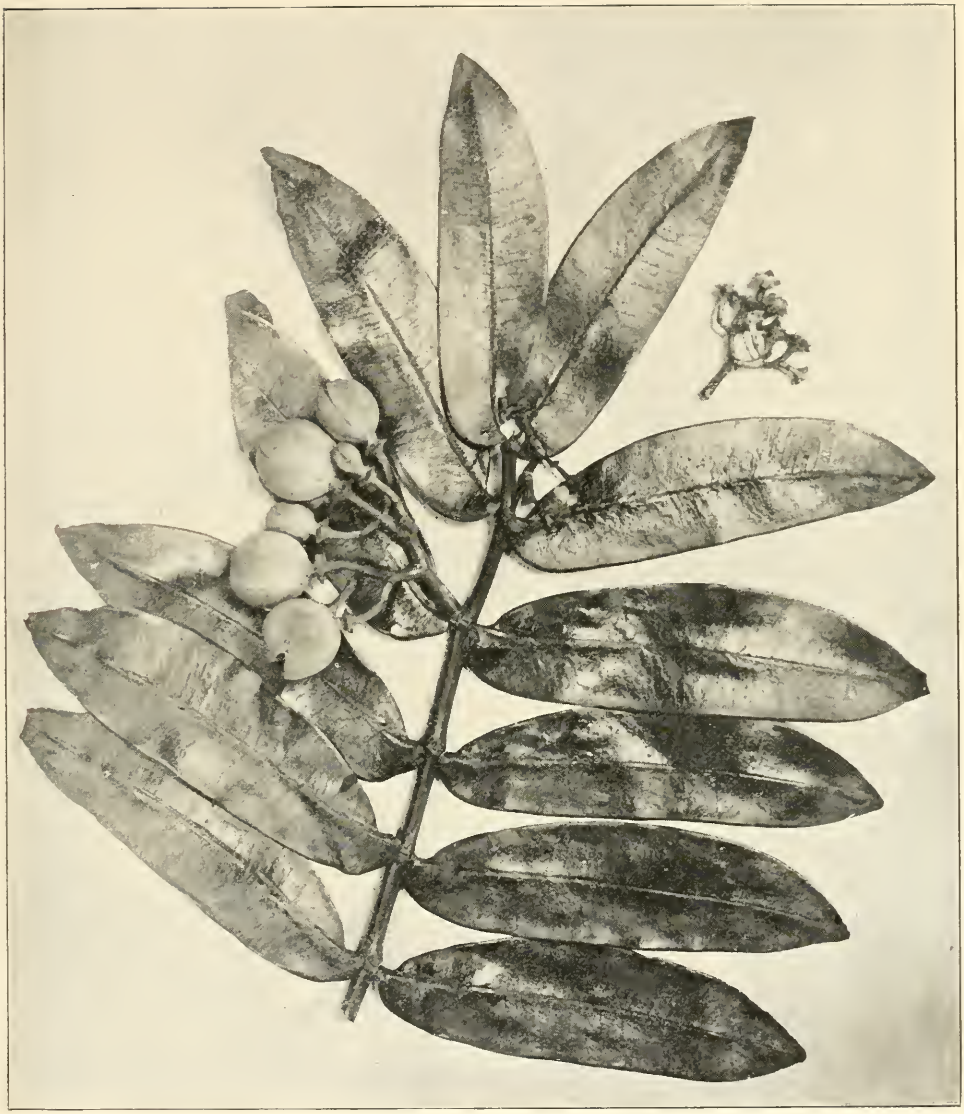
Euphorbia Rockii, sp. nov.

Arbor 1–3.5 m. alta, foliis oppositis, obovato-oblongis, inequalibus, obtusatis, basi rotundatis, 8–12×2.5–3 cm. brevissime petiolatis vel sessilibus; cymis axillaribus 3-4 cm. longis, pedicellis 5 mm. longis; involucri campanulati, lobis minimis, lanceolatis, acutis, glandulis transverse oblongis; capsulæ hexagono-obovatis, glabris, 2×2.2 cm.

Type locality, Punaluu Mountains, Oahu, H. I. Forbes & Rock, Sept. 14-21, 1908.

An erect shrub or small tree four to twelve feet high. Leaves opposite, obovate-oblong, obtuse, uneven-sided with a clasping base, nearly sessile, 3–4.5 × 1–1.25 inches. Flowers in open axillary cymes, 15–18 lines long. Involucre campanulate, minutely hairy or glabrous on the outside, pubescent on the inside, lobes ovate, minute, glands transversely oblong not appendiculate. Style branches short, nearly free. Capsules large 9×12 lines, on nodding peduncles.

This tree was discovered by Mr. J. F. Rock some two months before the gathering of the type material. The tree is distinguished by its large pink fruits, nearly sessile leaves and by its open cymes.



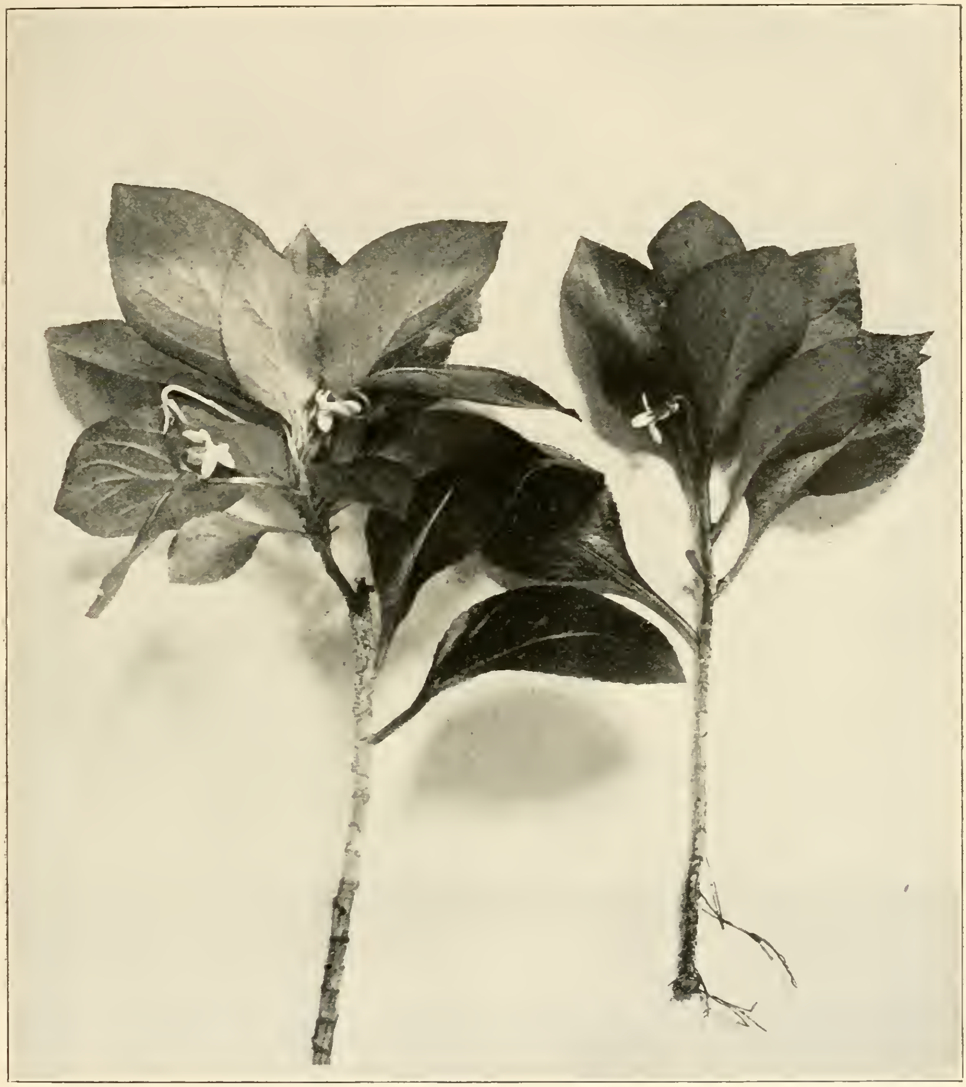
EUPHORBIA ROCKII FORBES.

Viola oahuensis, sp. nov.

Caule erecto 15–45 cm., foliis ovatis, serratis, acutis, basi acuminatis, 12–13 × 5–5.5 cm., petiolis pennatis 2.5 cm.; stipulis lanceolatis, acuminatis, glandular-serratis, 1.5–3 cm.; scapis umbellato biflores. Sepala lanceolata 8 mm. Petala oblonga vel orbicula, 16 mm. inferiore saccato. Capsula 1 cm. longa.

Type locality, Punaluu Mountains, Oahu. Forbes & Rock, Punaluu Mountains, Sept. 14-21, 1908.

Stem erect, simple or sparingly branched, 6 inches to 1 foot high. Leaves 4.5–5 × 2–2.25 inches, ovate, uneven-sided, glandular-serrate, acute, base acuminate drawn out into a winged petiole of 1 inch. Stipules lanceolate, glandular-serrate, acuminate, 7–14 lines. Scapes or peduncles one to three on a stem, 9 lines long, with two narrow acute bracts and a reduced leaf, bearing two flowers on peduncles of nearly equal length, about 2 inches, these bracteolate and often with a reduced leaf. Sepals lanceolate, faintly puberulent, 3 lines long. Petals about twice as long, white, broad, oblong to orbicular, the lower saccate, not bearded. Capsule a little over 5 lines long, glabrous.



VIOLA OAHUENSIS FORBES.

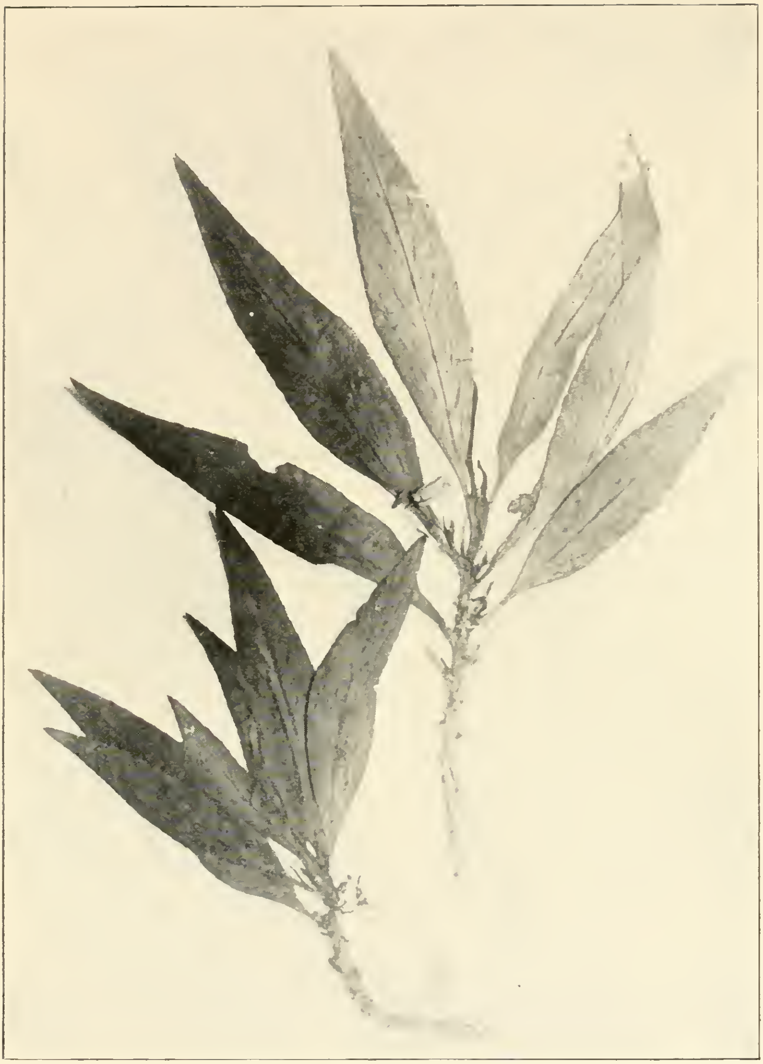
Viola Helena, sp. nov.

Caule erecto 3-6 cm., foliis lanceolatis 7.5 - 11.5 × 1.5 - 2 cm. dentibus glanduliferis stipulis lineari-lanceolatis, serratis, 8 mm.; scapis bibracteatis umbellato biflores. Sepala lanceolata 4-5 mm. Petala alba, inferiore latissime saccato. Capsula 1 cm. longa, glabra.

Type locality, Wahiawa Mountains, Kauai, H. I. J. M. Lydgate, May, 1908.

Plant one to two feet high.—Lydgate. Leaves lanceolate, tapering at both ends, glandular serrate, 3-4.5 inches long by 7-9 lines wide, with petioles of 2-3 lines. Scapes or peduncles one or two on a stem, 2-3 lines, with two to three linear bracts, bearing an umbel of two flowers on pedicels of 10 - 14 lines which have bractlets of about 1 line. Sepals lanceolate, 2 lines. Petals a little more than twice as long, the lower saccate, white, or pale lavender, lower and lateral ones bearded. Capsule glabrous, 7 lines long.

The species is named by Mr. Lydgate for his wife.



VIOLA HELENA FORBES & LYDGATE.

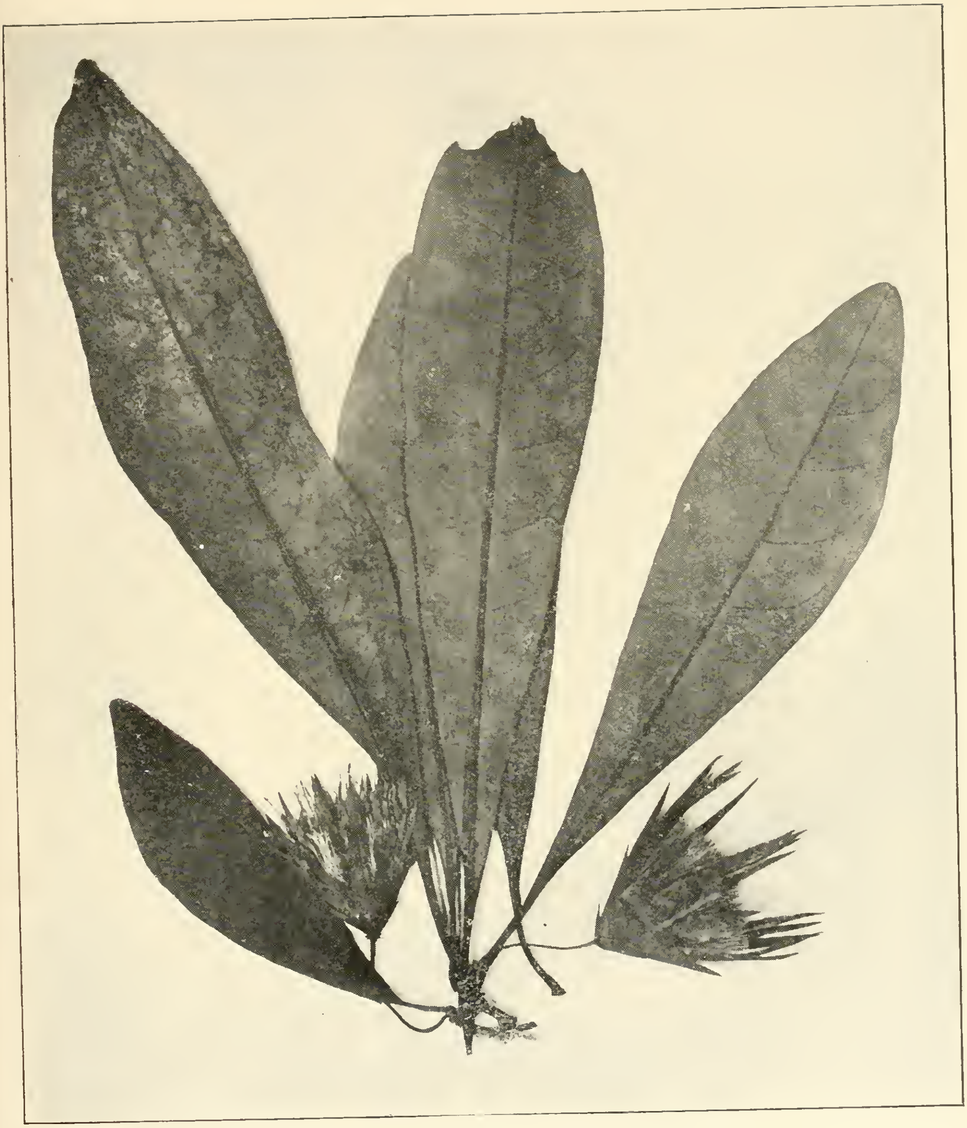
Hesperomannia Lydgatei, sp. nov.

Arbor 2–3 m. alta; foliis spathulo-ovatis, acutis, basi acuminatis, glabris, 10–22.5 × 2.5–5.4 cm., petiolis .8–2.5 cm. Capitulum 4–8.5 cm., pedunculibus attenuatis 3.5–4 cm. Involucrum campanulato-turbinatum, interioribus lineari lanceolatis 4–4.5 cm., exterioribus ovato-lanceolatis, brevioribus. Corollæ 2–2.5 cm. Stylus 6–7 cm.

Type locality, Wahiawa Mountains, Kauai. J. M. Lydgate, May, 1908.

Six to nine feet, lobelia habit of growth.—Lydgate. Leaves 4–9 × 1–1.5 inches with petioles of 6–12 lines, spathulo–ovate to oblong, acute, acuminate at the base, entire, glabrous. Heads 2–3 inches high, four or five in a terminal cluster, on slender peduncles of 1.5 inches. Involucre about 2 inches high, bracts in four to eight rows; outer bracts ovate-lanceolate, inner bracts much longer, linear-lanceolate. Corolla 12 lines, split to near the middle. Anthers 3 lines. Achenes (not mature), pappus pinkish, a little over 9 lines long.

This species is easily distinguished from the other species of Hesperomannia by the long slender peduncles, and by the shape of the leaves which are not dentate.



HESPEROMANNIA LYDGATEI FORBES.

Lysimachia longisepala, sp. nov.

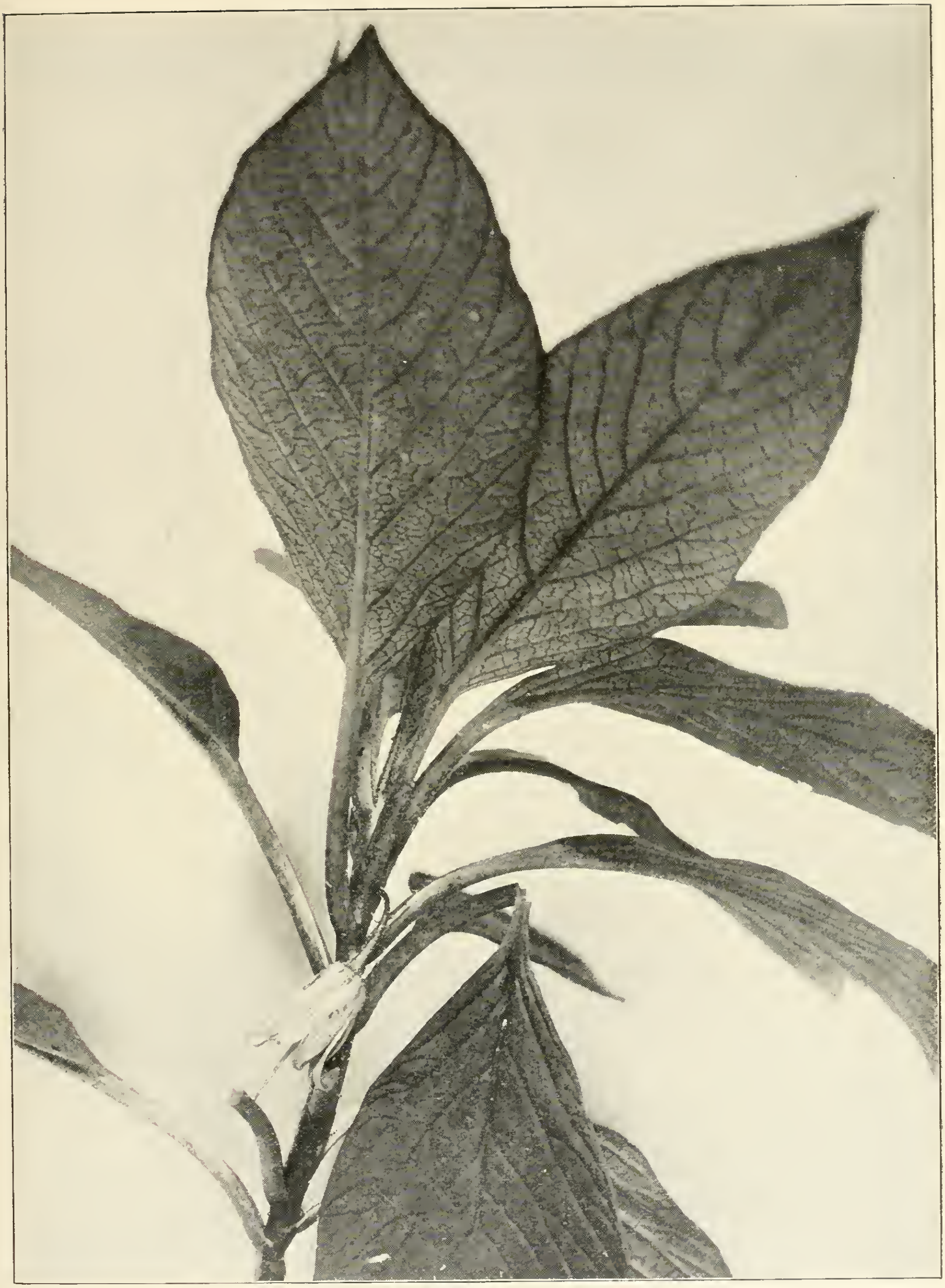
Folia ovata, acuminata, 11.5–15 × 5–6.5 cm., basi acuminata; petiolus tomentosus, 2–3 cm. longus. Flores 2–3, auxillaries; pedunculi tomentosi, 2–3 cm. longi; calyx lobis 6–8, lanceolatis, 2.5 cm. longis; corolla ovato-lanceolata, 1 cm. longa, filamenta basi dilata, subconnata. Capsula crustacea, 16 × 10 mm.

A suffruticose plant six inches to three feet in height, usually unbranched, the new growth being tomentose with purplish hairs, becoming glabrous with age. Leaves very dark green above, paler beneath, ovate, acuminate, 4.5–7.5×2–3.5 inches, the base narrowing into a tomentose petiole of 22 lines. Flowers pendulous, one to three in the axils of the upper leaves, on tomentose peduncles 9–14 lines long. Calyx green, marked with deep purple veins, and tomentose on the back with purple hairs, its deeply parted seven (6–8) lanceolate lobes longer than the corolla, 11 lines. Corolla colored as the calyx, its lobes ovate lanceolate, minutely serrate, 5 lines long. Stamens less than one half the length of the corolla, filaments dilated at the base, sub-connate. Style about the length of the corolla. Capsule bottle-shaped, thick, crustaceous, 8 lines long, 5 lines in diameter, tipped by the style of 8 lines in length.

Flowering specimens were first collected when in the company of Mr. J. F. Rock during September, 1908, and eight months later fruiting specimens were collected in the company of Dr. C. M. Cooke and Mr. C. L. Thompson. The plant occurs in wet woods of the Punaluu Mountains, Oahu. Elevation about 2,300 feet.

The difference between this species and the other Hawaiian *Lysimachias* seems almost generic. It is unique among our species for having a longer calyx than corolla, and otherwise differs in its more cylindrical flowers which are twisted tighter in the bud, and in its much larger leaves.

May, 1909. [222]



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Director's Report for 1909.

HONOLULU, H. I.
BISHOP MUSEUM PRESS.
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HONOLULU, H. I.
Bishop Museum Press.
1910

To the Trustees of the Bernice Pauahi Bishop Museum.

Sirs:—In accordance with the standing vote of the Trustees, I submit my annual report on the present condition of this Museum and the general course of work done in the year 1909.

William T. Brigham,
Director of the Museum.

Honolulu, April 13, 1910.

Ordered printed August 2, 1910.

REPORT

THE year 1909 has been one of progress in this Museum, but still more one of preparation. After some years of great inconvenience and repression from want of workrooms and of safe storerooms, towards the end of the year arrangements were made to build a Laboratory commensurate with the needs of such a museum as this has become in the twenty years of its existence, and probably before the end of another year this long desired building will be ready for use.

For more than a year the Museum staff has been insufficient for the work to be done, and our laboratory space precluded the employment of additional specialists, but the spirit of loyalty to the best interests of the Museum has animated our little company to efforts that seemed almost impossible in our limited and inconvenient quarters. We have been scattered ; one department working in Manoa Valley, another in Nuuanu Valley, while a third has operated in the midst of the fish market region. Such segregation has somewhat lessened the resulting accomplishments, and the prospect of a new portion of the building where all departments have their own quarters within reach of the collections and the working library is a most agreeable one.

It has not seemed well to recommend the appointment of a marine zoologist for the staff because we had no suitable place for the preparation and study of specimens of the wonderful marine life to be found on our reefs at all seasons of the year. Not a day of the three hundred and sixty-five when fear of malaria haunts the shore or a low temperature checks the life current of the coral polyp or any other of the (often undescribed) inhabitants of the clear waters that surround these islands. In no marine zoological station already established are there such ideal conditions for study, and should it be announced that we desired a marine zoologist many would be the applicants for such a chance for original investigation. To those who rate highly the discovery of new species our reefs offer a rich field, for in the collections made in three days by the members of the present staff on this island and on Molokai, none of them specialists in marine zoology, Dr. Vaughn, of the United States National Museum, found a dozen new species, some of great interest. Surely this mine is not yet worked out; it is easily accessible and vastly attractive. But to those who desire to know more of the structure and life history of the reef-dwellers a more convenient place for study can hardly be desired than here found on our reefs.

In the deed which established the Bernice P. Bishop Museum as an independent institution, definite reference was made by the founder to the possible establishment, under the auspices of this museum, of a Marine Aquarium for the study of life on our reefs and the public exhibition of their most interesting inhabitants in a living condition. While the funds are not at hand for such an establishment as should be on this island, much can be done with the conveniences of the new laboratory to collect and study the smaller "Harvest of the Sea," and it is hoped that another year may see the department of Marine Zoology inaugurated.

It would be pleasant to anticipate some of the many advantages to accrue from the possession of suitable work- and store-rooms, but it is perhaps wiser to wait until we move into and try our new domain, and are able to install the apparatus brought from Berlin fourteen years ago. After such an interval we can surely wait another twelvemonth.

From the things that may be in the future we turn to some of those in hand, and it is pleasant to call attention to the gift by the Hon. Wm. R. Castle of perhaps the most valuable single collection we have received by gift. I had been in correspondence with one of the Australian pioneers, Mr. J. F. Connelly, a surveyor who had explored extensively in western Australia for many years. He had collected from the natives among whom his profession led him, a fine series of implements of peace and weapons of war, which he wished to dispose of. We had no funds and it seemed impossible to save these treasures, when Mr. Castle came to our aid and purchased for us the collection which is now in our cases and has more than doubled our former collection of Australian specimens. The list given by Mr. Stokes shows the extent, but it would take much more space to tell its great value. With more of such friends it would be quite possible to make this Museum a great one, greater than any expensive exploring expeditions could achieve so far as specimens go, for no longer are these things to be had among the peoples who made and used them. Only in a few private collections made years ago exist the desiderata for our shelves. I am following many of these with anxious eye, but have not the funds needed to acquire them, and they will probably go to the rich museums of Europe that have a Government treasury behind them.

The accessions to the Library continue both as the result of exchange of publications and the purchase of books. In all cases the purchases are limited to the most pressing demands of a "working library" in a region so remote from scientific libraries. It will not be long before our library, now quartered in the upper gallery of Hawaiian Hall will require additional accommodation, all the cases made for books being now full to their utmost capacity. Neither will it be long before the opening of this upper gallery to the public must be considered, for the cases in the first gallery are nearly full. Closely connected with our library is the Museum Press soon to move into new and spacious rooms. The publications during 1909 were the Index to Fornander's Polynesians, by Mr. Stokes, issued as a special volume in small edition and not on our exchange list; this is considered a good example of indexing, and has proved of great use to many who have used it. This was followed by the Annual Report, and the year closed with the publication of the fourth and last part of Volume II of the Memoirs, a brief history of the volcanoes Kilauea and Mauna Loa on Hawaii. Of course there has been the usual large amount of label work and the miscellaneous printing the Museum requires. It has been a great hindrance having the presswork done in town, and it will be a matter for early consideration whether we should not make better work in the new printery on a hand press; if the work is to still be done in town a much larger font of type should be provided, as forms are locked up and delayed in town beyond reasonable measure. Lest this should seem a reversion to ancient methods, let us remember that the finest work has always been done on the old hand press, and this is universally used for the proofs of the half tone engravings which form so large a part of modern illustration. The printing of a volume on Kapa-making has already been arranged, and it is thought that this will be ready during 1910 as Volume III of the Memoirs. The illustrations have many of them been made in Vienna in color and are faithful reproductions of the beautiful kapa still existing in this Museum and in the Director's private collection, which includes most of those Cook brought home. Unfortunately under the tariff these plates which will cost nearly five dollars a set, are subject to a duty of 25%, although they could not be made of such quality in America at present.

Department of Ethnology.

In the Department of Polynesian Ethnology Mr. J. F. G. Stokes, the Curator, has continued his studies of the curious Hawaiian fish-traps and conservation ponds and his results appear later in this series. Mr. Stokes has also spent some time on Molokai surveying the remains of the ancient *heiau* or temples, and while thus engaged found time to make collections of great value, among them a collection of plants and the curious and little known Kalaina wawae, specimens of which, given by Mr. George

P. Cooke, are now in the Museum and will be described later. Some other gifts have been received and are acknowledged in the list of accessions given below.

Department of Pulmonata.

Dr. C. M. Cooke, the Curator of Pulmonata, has made very extensive collections in his department and has spent much time on the Ancey collection. He reports: "Number of specimens collected or sent to the Museum for identification, 27,333. Catalogue numbers, 1347. The Thwing collection, numbering nearly 40,000, was purchased by the Trustees. It is hoped that the cataloguing of this magnificent collection will be finished during 1910.

"Specimens have been received from Messrs. I. Spalding, C. N. Forbes, A. F. Knudsen, H. Podmore, W. H. Rice Jr., Judge C. S. Dole, A. F. Judd, C. H. Cook, E. Deverill, F. W. Terry and Dr. H. E. Crampton."

Department of Botany.

Mr. Charles N. Forbes has continued his good work in this Department of which he has now been appointed Curator, and this may be partly seen in his report. He also has an account of a new Hawaiian plant. His report is as follows:—"An excursion for the purpose of collecting and studying the vegetation of Kauai was made during the months of July, August and September. Four bases were established as follows: Hanalei, from which the region Kalalau and the power line trail was gone over; Lihue, from which the surrounding region was slightly covered; the McBryde mountain house and Mr. Gay's mountain house. Side trips were taken up Hanapepe and Olokele valleys. In covering so large a region in so short a time hardly more than a superficial survey could be made of any one place. About 500 different varieties were collected, and a good preliminary knowledge of the vegetation of the island was acquired A large part of the success of the trip was due to the friendly interest shown by many of the people of Kauai, and especial thanks are due to Rev. J. M. Lydgate, Judge C. S. Dole, Mr. Francis Gay and Mr. E. G. K. Deverill. The exploration of Oahu has been continued, essentially the same regions being covered as given in the last report.

"Most of the loose and unmounted material has been classified and incorporated into the Herbarium. Much trouble has been occasioned by small mites; and besides the preliminary fumigation which every specimen receives before being placed in the cases, the whole herbarium has been fumigated three times, twice with carbon disulphide and once with hydrocyanic acid gas, the latter method only proving effective. As the two rooms where the Herbarium is stored are small and tight, this method can be followed easily and with little danger.

"The Herbarium contains specimens of nearly every species so far reported from these islands, but contains no series illustrating the variations which are so striking on this group, and which are of the greatest importance to the modern botanist. Many of our specimens lack the exact localities from which they were taken, which are now recognized as of the utmost importance. For these reasons it would be advisable to increase our collections as rapidly as possible. The Herbarium consists of:—

The Mann & Brigham Herbarium 1864-5 (all groups)	909	
The General Herbarium:—		
Higher Plants.		
Hawaiian:		
Edw. Bailey Collection	267	
A. A. Heller Collection	317	
Other sources	287	1780
Duplicates and unmounted material	5000	5000
Exotics:		
New Zealand	183	
Australia	300	
Other Pacific Islands	349	
Miscellaneous	380	1304
Thallophytes (not yet arranged):		
Hawaiian	1991	
Exotic	480	2471
Making a total of		10,555

"The Director started an exchange with the Australian Botanic Garden in Sydney last year, and we have already exchanged 300 specimens. It is hoped that visits may be made to the other islands of this group, if for no other purpose than to keep up this valuable exchange. It would also be of advantage to extend these exchanges.

"Accessions during the year.—The following gentlemen have added specimens to the Museum: Dr. W. T. Brigham, 30 specimens, Maui; Dr. C. M. Cooke, 1 specimen, Oahu; Albert F. Judd Esq., 3 specimens, Hawaii; Rev. J. M. Lydgate, 78 specimens, Kauai; Mr. J. F G. Stokes, 126 specimens, Molokai; Mr. C. B. Thompson, 5 specimens, Oahu; Mr. J. W. Thompson, 2 specimens, Oahu, 1 specimen, Molokai; Dr. E. V. Wilcox, 2 specimens, Oahu."

Mr. J. W. Thompson has continued his good work in making casts of the fish found in the Honolulu waters, and we have now over three hundred accurately colored casts. As may be supposed, the new fish are less and less frequent, and it will soon be necessary for our artist to visit the other islands of the group to obtain those specimens of the Hawaiian fish fauna that are peculiar to each of the islands.

The attendance of visitors during the year is shown in the table; there is a total attendance of visitors exceeding that of 1908 by 1940. When we examine the table by nationalities we find an increase of white visitors of 251, and of Japanese of 2133, the latter due to the presence of a training ship of that nation, when it seemed that nearly all both officers and men came to the Museum; of Hawaiians 246 less than the previous year.* The Trustees found it necessary to forbid the admission of children under five years of age, as women brought many babes in the arms and children too young to go alone, and spent the day, until the nursery noises and operations became a great nuisance, and the enforcement of the rule has been a great relief to visitors as well as to the staff; probably several hundred babies have been excluded, although cases have occurred where oriental mothers have claimed that unweaned babes were over five years old.

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*The small attendance during February was due to closing the Museum on account of oiling the roads in the yard; only those with permits from the office were admitted.

TABLE OF ATTENDANCE.

1909.	Whites.	Hawaiians.	Portuguese.	Chinese.	Japanese.	Others.	Open on		Visitors on closed days.	Average Attendance.		Total Visitors.
							Public days.	Other days.		Public days.	Other days.	
January	473	132	34	311	198	5	11	2	7	104	4	1153
February	137	2						6	139		23	139
March	356	65	13	9	18	8	4	12	223	62	19	469
April	453	247	56	164	529	26	9	8	372	123	46	1475
May	666	150	76	104	490	6	10	4	81	141	20	1492
June	292	93	33	74	1297	7	8	3	40	220	13	1796
July	525	65	16	53	662	19	10	6	68	127	11	1340
August	449	69	62	138	111	42	8	4	39	104	10	871
September	317	84	25	106	92	38	9	4	28	70	7	662
October	387	124	83	178	164	6	10	5	47	89	9	942
November	344	99	22	61	385	7	8	3	23	112	8	918
December	324	88	20	89	54	14	8	1	5	73	5	589
Totals	4723	1218	440	1287	4000	178	95	58	1072	113.4	18.5	11,846

List of Accessions.

ETHNOLOGICAL.

Gifts.

The Connelly collection of Australian material, presented to the Museum by the Hon. W. R. Castle of Honolulu. Made by Mr. John F. Connelly of Melbourne, Australia:—

9721–9755	Boomerangs, from all the states.
9756–9760	Coolardie or whirlers. Western Australia.
9761	Yinmarrie, ceremonial stick. Western Australia.
9762	Churinga, ceremonial stick. Western Australia.
9763	Dowak-mero, ceremonial stick. Western Australia.
9764	Mero, spear-thrower. Western Australia.
9765	Yinmarrie. Western Australia.
9766	Dowak-mero. Western Australia.
9767–9776	Mero. Western Australia.
9777	Stone club. New Guinea.
9778–9789	Clubs, Coondie and Nulla. Western Australia and New South Wales.
9790	Gin's club or yam stick, Wannah. Queensland.
9791–9792	Tomahawks. Western Australia.
9793–9794	Shields, Woondah. Western Australia.
9795	Shields, Helimon. New South Wales.
9796–9798	Wooden bowls, Coolamon. West and South Australia.
9799	Walking staff. New Zealand.
9800	Bead bracelet. Solomon Ids.
9801	War dress. Northern Australia.
9802–9813	Dresses and ornaments. Western Australia.
9814	Circumcision knife. Western Australia.
9815–9816	Stone chisels. Western Australia.
9817	Implement (? saw). New South Wales.
9818	Surgical implement. New South Wales.
9819	Skin dresser or burnisher. New South Wales.
9820–9822	Mill stones. New South Wales.

9823	Ax or adz head. New Guinea.
9824–9825	Mill stones. New South Wales.
9826	Adz or chisel. New Zealand.
9827–9828	Mill stones. New South Wales.
9829	Native cement. Western Australia.
9830	Tomahawk. New South Wales.
9831	Phallus or pestle. New South Wales.
9832	Pounding stone. Victoria.
9833–9835	Chisels. New Zealand.
9836–9837	Tomahawks. New South Wales.
9838–9839	Pounding or husking stones. New South Wales.
9840	Native paint, Wilgie. New South Wales.
9841	Pounding or husking stone. New South Wales.
9842	Native paint. Western Australia.
9843	Native flints. New South Wales.
9844–9851	Stone spear heads. Western Australia.
9852–9855	Glass spear heads. Western Australia.
9856	Spear thrower. Western Australia.
9857–9858	Jab sticks. Western Australia.
9859–9860	Boolyah stones. Western Australia.
9861	Kangaroo sinews. Western Australia.
9862	Native cement. Western Australia.
9863–9864	Message sticks, Wongi. Western Australia.
9865	Native paint. Western Australia.
9866	Spear thrower, Womerah. Queensland.
9867	Police baton. Western Australia.
9868–9893	Spears. Western Australia.
9894–9901	" South Australia.
9902–9904	" Queensland.

9698	Noa stone. Oahu. Given by Dr. C. Montague Cooke.
9699	Grindstone fragment. Molokai. Id.
9701	Hammer. Molokai. Id.
9702	Hammer. Oahu. Given by Dr. Wm. T. Brigham.
9708	Hammer. Molokai. Given by Mr. G. P. Cooke.
9917	Mat. New Zealand. Given by Miss Ellen Sobey.
9921	Sinker for upena uhu. Molokai. Given by A. F. Judd, Esq.
9922	Hammer. Molokai. Id.

9923 Fish hook. Molokai. Given by Mr. James Munro.
9924–9927 Small adzes. Molokai. Id.
9928–9929 Shell beads. Molokai. Id.
9931 Wand. Molokai. Id.
9935–9937 Sections of Kalaina wawae. Molokai. Given by Mr. G. P. Cooke.

Purchases.

9670 Feather Cape.

Exchanges.

9905 Arm ring. Fiji.
9906 Girl's necklace. Fiji.
9907 Whale's tooth ornament. Fiji.
9908 Wooden bolt. Fiji.
9909 Cannibal fork. Fiji.
9910 Roll of sennit. Fiji.
9911 Fly Whisk. Fiji.
9912 Whale's tooth bolt for "Tiqua". Tonga.
9913 Breast ornament. Tonga.
9914 Fish hook. Tonga.
9915–9916 Dilly bags. Australia.

Collected.

9703 Offerings from a fish altar. Molokai.
9707 Offerings from Kaliuwaa gulch. Oahu.
9918 Carved stone. Molokai.
9932 Ulumaika. Molokai.
9933 Polishing stone. Molokai.
9934 Squid sinker. Molokai.

GEOLOGICAL.

9671–9685 Well borings. Honolulu. Given by Mr. J. E. Ward.
9686–9690 Lava stalagmite. Kilauea. Given by Rev. W. D. Westervelt.
9691 Lava deposited on tree branch. Id.
9692 Ferns charred by lava. Id.
9700 Hematite. Molokai. Given by Dr. C. Montague Cooke.

9704	Kaolin. Molokai. Given by Miss Ellen Sobey.
9705-9706	" " Given by A. F. Judd, Esq.
9909-9910	Weathered basalt. Molokai. Collected.
9939	Basalt. Molokai. Collected.
9939-9947	Sandstone. Molokai. Collected.
9948	Kaolin. Molokai. Collected.

RELICS.

Given by Hon. A. S. Cleghorn, ex-Governor of Oahu.

9531	Gold watch, once the property of His Highness Charles Kanaina.
9532	Silver watch, given by the British Government to Governor Kekuanaoa in 1824.
9533	Gold watch, belonged to Hon. Mrs. Bishop.
9534	Gold watch, belonged to Her Royal Highness Victoria Kamamalu.
9535	Gold watch, belonged to Her Royal Highness Likelike.
9536	Gold watch, belonged to Her Royal Highness Kaiulani.
9537-9538	Silver bowl and spoon, belonged to H. R. H. Kaiulani.
9539	Silver powder box.

9697	Piece of U. S. S. "Vandalia." Given by Mrs. W. F. Allen.

MISCELLANEOUS.

9696	Exhibit of threads from cotton raised on Oahu in 1865. Given by Mr. James W. Robertson.

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Amherst, Mass.—Amherst College Library.
Amsterdam, Holland.—Universiteit van Amsterdam.
Auckland, N. Z.—Auckland Institute.
Baltimore, Md.—Johns Hopkins University.
  Maryland Geological Survey.
Barcelona, Spain.—Real Academia de Ciencias y Artes de Barcelona.
Berkeley, Cal.—University of California.
Berlin, Germany.—Anthropologische Gesellschaft.
  Königl. Museum für Völkerkunde.
Berne, Switzerland.—Bern Historisches Museum.
Boston, Mass.—Boston Public Library.
  Boston Society of Natural History.
  Museum of Fine Arts.

Bremen, Germany.—Museum für Natur-, Völker- und Handelskunde.
Brisbane, Queensland.—Royal Society of Queensland.
Brooklyn, N. Y.—Museum of the Brooklyn Institute of Fine Arts and Sciences.
Brussels, Belgium.—Société Royale Malacologique de Belgique.
Buda-Pest, Hungary. Museum National Hongrois.
Buenos Aires, Argentine Republic.—Museo Nacional de Buenos Aires.
Buitenzorg, Java.—Jardin Botanique de Buitenzorg.
Calcutta, India.—Asiatic Society of Bengal.
  Indian Museum.
Cambridge, Mass.—Harvard University Library.
  Museum of Comparative Zoology.
  Peabody Museum.
Capetown, S. Africa.—South African Museum.
Chicago, Ill.—Field Museum.
Christchurch, N. Z.—Canterbury Museum.
Cologne, Germany.—Rautenstrauch-Joest Museum.
Copenhagen, Denmark.—Société Royale des Antiquaires du Nord.
Dresden, Germany.—Königl. Zoologisches und Anthropologisch-Ethnographisches Museum.
Dublin, Ireland.—Royal Irish Academy
Edinburgh, Scotland.—Royal Society of Edinburgh.
Florence, Italy.—Società Italiana di Antropologia.
Frankfurt on Main, Germany.—Städlisches Völker-Museum.
Geelong, Victoria.—Gordon Technical College.
Genoa, Italy.—Museo Civico di Storia Naturale di Genoa.
Halle, Germany.—Kaiserl. Leop. Carol. Akademie der Naturforscher.
Hamburg, Germany.—Museum für Völkerkunde.
Hanover, N. H.—Dartmouth College.
Hilo, Hawaii.—Hilo Public Library.
Honolulu, Hawaii.—Hawaiian Evangelical Association.
  Hawaiian Historical Society.
  Hawaiian Sugar Planters' Association.
  Honolulu Library Association.
  Oahu College.
  United States Experiment Station.
Lawrence, Kansas.—University of Kansas.
Leiden, Holland.—Rijks Ethnographisches Museum.
  's Rijks Museum van Natuurlijke Historie.
Leipzig, Germany.—Museum für Völkerkunde.
Liverpool, England.—Liverpool School of Tropical Medicine.
London, England.—Linnean Society of London.
  Royal Anthropological Institute.
Madras, India.—Government Museum.
Manila, P. I.—Bureau of Science.
  Ethnological Survey.
Melbourne, Victoria.—Royal Society of Victoria.
Mexico.—Instituto Geológico de Mexico.

Munich, Germany.—Ethnographisches Museum.
New Haven, Ct.—Connecticut Academy of Arts and Sciences.
  Yale University Library.
New Plymouth, N. Z.—Polynesian Society.
New York, N. Y.—American Museum of Natural History.
  Columbia University Library.
  New York Botanical Garden.
Oberlin, O.—Oberlin College.
Para, Brazil.—Museu Goeldi.
Paris, France.—École d'Anthropologie.
  Société d'Anthropologie.
Philadelphia, Pa.—Academy of Natural Sciences of Philadelphia.
  American Philosophical Society.
  Free Museum of Science and Art.
  The Philadelphia Museums.
  University of Pennsylvania.
  Wagner Free Institute of Science.
Pietermaritzburg, South Africa.—Natal Government Museum.
Pittsburg, Pa.—Carnegie Museum.
Plymouth, England.—Marine Biological Association of the United Kingdom.
Rome, Italy.—Accademia dei Lincei.
St. Louis, Mo.—Missouri Botanical Garden.
Salem, Mass.—Peabody Academy of Science.
San Francisco, Cal.—California Academy of Sciences.
Sâo Paulo, Brazil.—Museu Paulista.
Stanford University, Cal.—Leland Stanford Junior University.
Stockholm, Sweden.—Kongl. Vitterhets Historie och Antiqvitets Akademien.
Sydney, N. S. W.—Australian Museum.
  Department of Agriculture.
  Department of Fisheries.
  Department of Mines.
  Linnean Society of New South Wales.
  Royal Society of New South Wales.
  Technological Museum.
Tufts College, Mass.—Tufts College.
Vienna, Austria.—Anthropologische Gesellschaft in Wien.
  K. K. Naturhistorisches Hofmuseum.
Wanganui, N. Z.—Public Museum.
Washington, D. C.—Bureau of American Ethnology.
  Carnegie Institution of Washington.
  Library of Congress.
  Smithsonian Institution.
  United States Geological Survey.
  United States National Museum.
Wellington, N. Z.—New Zealand Institute.

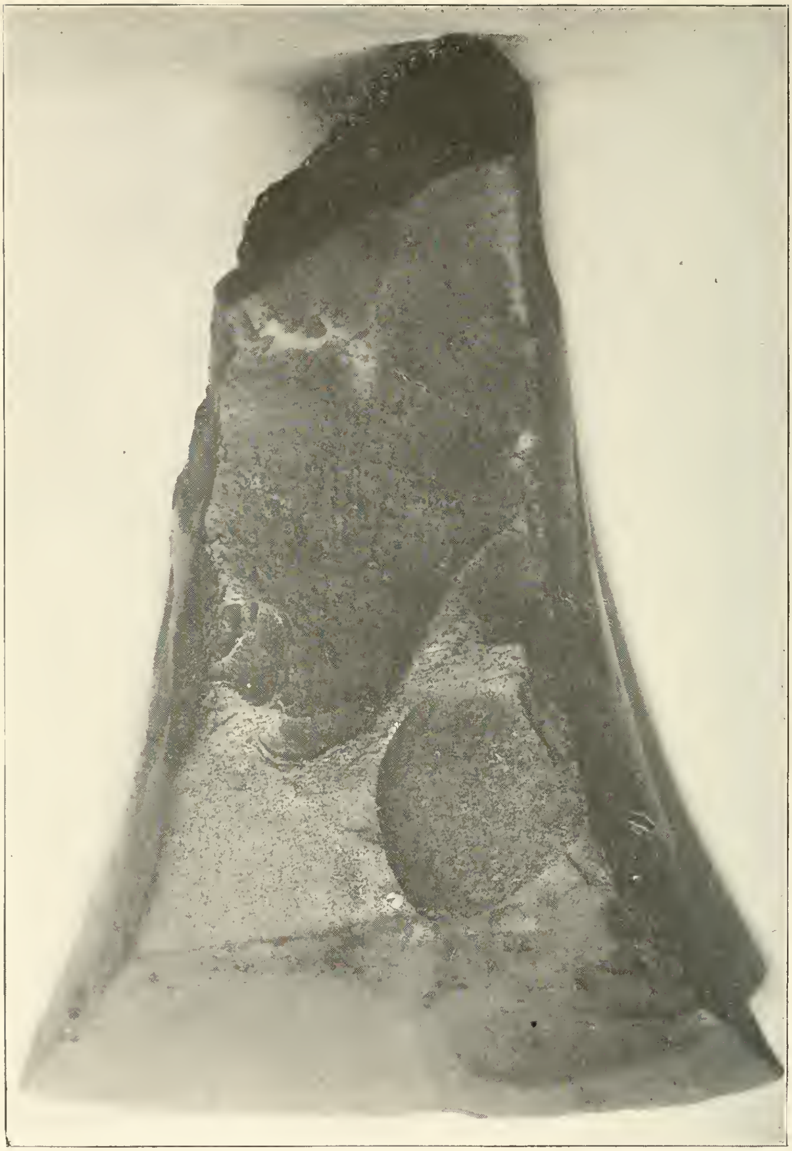

FIG. I. CURVED STONE ADZE. (OBVERSE.)

Hawaiian Curved Adzes.

BY WILLIAM T. BRIGHAM.

IT has long been a puzzle to me how the ancient Hawaiians cut the bottom of their canoes on the inside so evenly curved: it seems possible only on the supposition that polishing stones were used to grind down the irregular cut of the common adze which seldom has a face of more than two inches in width. In the extensive collection of stone adzes in this Museum there is not one that a modern carpenter would have selected for cutting a canoe bottom. I had seen the old-time canoe makers wield the clumsy looking stone adze (after cutting the rough work with a foreign steel adze) with a skill and certainty difficult to acquire, leaving the outside of the canoe with a fairly smooth surface, but I never happened to meet one working on the inside, which was generally left to the last.

Anyone who has seen the procedure of bailing out a genuine native canoe with a fragment of gourd umeke will understand the importance of a smooth, evenly curved bottom. It was gratifying to find at last a tool capable of doing what seemed needed in fashioning such a bottom. During the past year Mr. William Wagener has brought to my notice an adze found by him in Hamakua, Hawaii. To him it was a rare form, as he had seen only one other, and he deposited it in this Museum for study and casting. As will be seen in Fig. 1, the shank has been broken (recently) and there are a few nicks in the cutting edge, but the finish is careful and complete. If we allow for the broken shank its weight would exceed 4.5 lbs. Its peculiarity consists in the double curve of its cutting edge which is beautifully regular. The stone is dark-blue phonolite with a brown oxydized surface. Weight 3 lbs. 9 oz.; breadth 5.7 in.; length 8.2 in. (10.2 when entire?); thickness 2 in. (Figs. 1 and 2.)

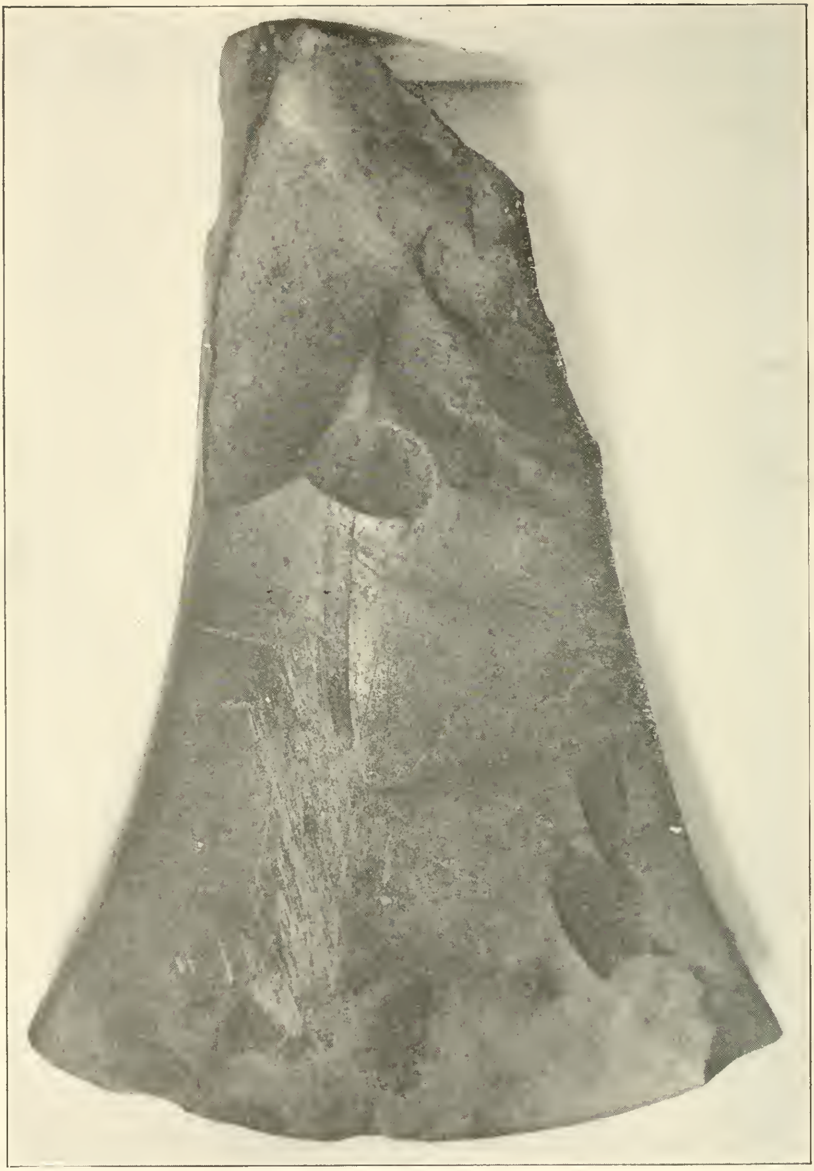

FIG. 2. CURVED STONE ADZE. (FRONT.)

Notes on Hawaiian Petroglyphs.—I.

By John F. G. Stokes.

During the past four years the writer has at different times collected data on Hawaiian petroglyphs and had planned, at some future date when the material gathered seemed complete enough, to prepare a paper on the subject or place the information gleaned in the hands of a more able person for the same purpose. The manifold duties of a member of a small museum staff have so largely interfered with the carrying out of these plans that the time of their consummation is too indefinite; and rather than keep from students of Hawaiian ethnology the information that should be theirs, the knowledge so far gained is submitted herewith as No. 1 of a series in which it is hoped to publish from time to time as discovered or communicated unrecorded data on the subject.

The first observer to record petroglyphs on these islands was Mathison[1] who in 1822 saw a pictured stone on Oahu. The following year Ellis[2] frequently saw along the southern coast of Hawaii "a number of straight lines, semicircles or concentric rings, with some rude imitations of the human figure cut or carved in the compact rocks of lava." Fornander[3] observed them on a hill at Kalae, Molokai, but appeared to see in them only an evidence of phallic worship. Krämer[4] saw a number on the same hill and illustrated several of the figures. At this same time (beginning of 1898) Farley[5] recorded his observations on the numerous petroglyphs occasionally uncovered by storms on the beach at Koloa, Kauai. Two years later Thrum[6] published an account of a discovery at Koko Head on Oahu, and in 1904 appeared a more extensive article containing new, and an excellent review of previous observations by A. F. Judd.[7] The latest reference which has come under the writer's notice is the interesting article on "The Pictured Rocks of Naalehu" by the Rev. W. D. Westervelt[8] in 1906.

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[5] Farley, J. K. The Pictured Ledge of Kauai. Hawaiian Annual for 1898 (Thos. G. Thrum, publisher). Honolulu, 1898. p. 119.

[6] Hawaiian Annual for 1900, p. 126.

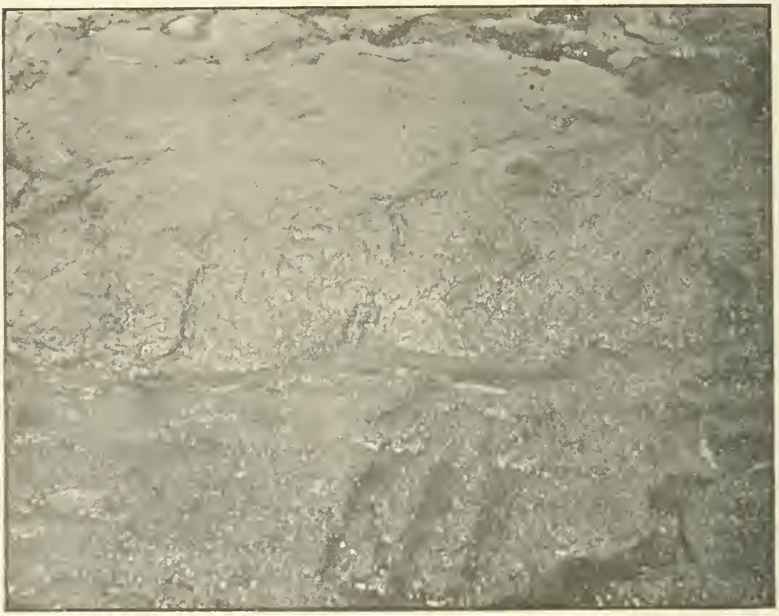

FIG. 1. PETROGLYPHS AT KAHALUU, NOT CHALKED.

The following notes were mainly gathered during the writer's journeys round the islands of Hawaii in 1906 and Molokai in 1909 while surveying the ancient places of worship and collecting available data for the assistance of the Director in his proposed monograph on Hawaiian heiau, under a grant from the Carnegie Institution of Washington. Since the object of the expeditions was as just outlined and the travelling expenses were defrayed by the Institution, the writer did not feel at liberty to give as much time to the subject of petroglyphs as he would have desired, or have taken, had the expedition been entirely financed by the Bishop Museum. In addition to these notes are included illustrations of petroglyphs gathered by Mr. Judd since his last paper, and kindly given to the Museum.

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[7] Rock Carvings of Hawaii. Hawaiian Annual for 1904, p. 179.

[8] Hawaiian Annual for 1906, p. 164.

Kona, Hawaii.—The attention of the writer in the field was first drawn to petroglyphs at Kahaluu, near the heiau of Keeku, by information from a native that there was a picture on the beach. As the tide had ebbed, an examination was made of the remains of an ancient lava flow extending seaward about two hundred and fifty feet from the beach, and at a point about twenty-five feet from the sand was a doubly outlined petroglyph (Fig. 1), representing a headless human figure, cut into a smooth part of the lava to a depth of .5 inch. The guide said it was Kamalalawalu. Around it in all directions were numerous faint single-lined figures (Figs. 2, 3) which the native appeared to see for the first time, and which he suggested were Kamalalawalu's men. Preparations were at once made to photograph the figures, but as it was believed that none of them except the first mentioned were deep enough for the faint grooves to be detected by the camera, a mixture of

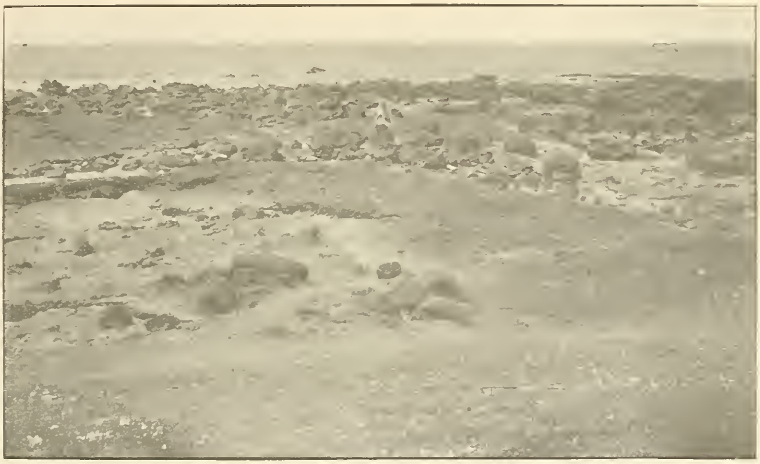


FIG. 2. PETROGLYPHS AT KAHALUU, LOOKING WEST.

white lead and kerosene was tried, there being no prepared paint available. Great care was given to the outlining of these figures, and when they were incomplete, either through erosion by the sea or possibly for the reason that the work had been left unfinished by the artist, no exercise of the imagination was permitted to interfere with the presentation of anything but the parts which could be clearly traced. The paint mixture was not successful, and later a thin line of chalk along the middle of the grooves was found amply sufficient.

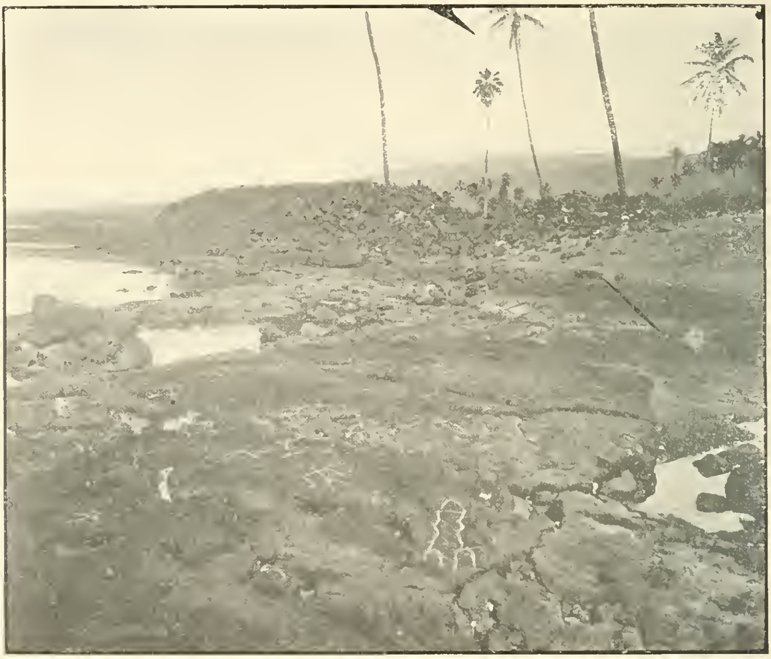
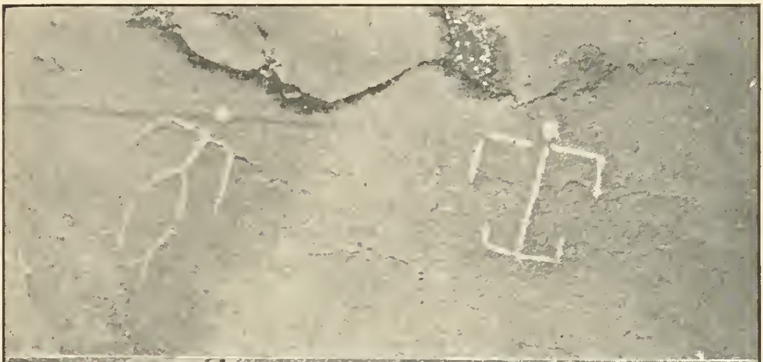


FIG. 3. PETROGLYPHS AT KAHALUU, LOOKING NORTH-EAST.

All the figures except that of Kamalalawalu were rather smoothly and evenly graved in thin rounded channels of a general width of .4 inch and a depth of .1 inch. The heads of the smaller ones when not outlined were cup-marks of about .3 inch in depth; and of the larger, flat and shallow depressions of the same depth as the outlines of the figures. They were probably made by hammering or pecking with a beach pebble, as the measurements of the grooves might indicate. Previous observers have been wont to refer to the native stone adze as the cutting implement for the petroglyphs they were describing, but even if the stone adze could keep its edge when cutting into stone strata sometimes as hard as itself, there is nothing in the petroglyphs or within reason to demonstrate why the workers should ignore a simple and effective tool like a pebble, which they could obtain anywhere without effort, in favor of the laboriously wrought stone adze. Dr. Brigham[9] has demonstrated the facility with which the natives could use the beach pebbles when working in stone, and the writer has seen natives of today hammer out their names or initials on a flat rock, in neat and symmetrical letters, with nothing but a small stone

FIG. 4.



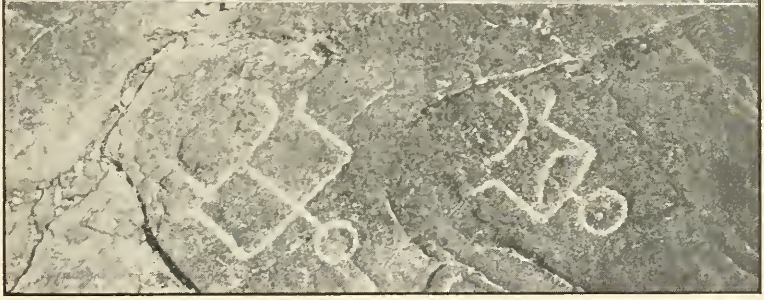


FIG. 5.

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[9] Hawaiian Stone Implements, Mem. B. P. B. M., vol. i.

picked at random. It should also be mentioned that this work would be done in a surprisingly short time, and when finished the grooves would have measurements corresponding proportionately with the greater number of petroglyphs so far seen. In the ancient work the channels may have been rubbed down, in place of being hammered, or smoothed by rubbing after abrading with the hammer, but after an examination of the initials and names above mentioned, no need for any smoothing process could be seen In referring to the figures below, the measurements given are of the length, taken from photographs, and are approximate.

Leaving the narrow sandy beach, and proceeding westward the first petroglyph (Fig. 2) met is incomplete, representing either the shoulders and arms or the wide-spread legs of the human figure. Next, in the same order, are two forms (Fig. 4) close together which are unlike any others so far observed; the first, length 10 inches with squared joints, has a very peculiar upward turn at the knees, which posture is difficult to explain. The second, length 13 inches, has proven unique in these investigations so far on account of the fact that the rock at the knees has not been abraded and is on the same level as the original surface; the contiguous outline of the figure was very distinct. It probably was intended to portray some person or object with broken legs. Another point of peculiarity was the two-pronged feet—when the foot is represented at all it is generally by a single line at an obtuse angle to the part of the leg adjoining. A little to the north is the figure of an orator or a spear thrower (Fig. 6). The next couple of figures, 13 and 15 inches long, have the heads outlined, and the smaller has two small punctures for the eyes (Fig. 5). The last, in place of the usual central line for the trunk, has a curve to represent the chest or breast.

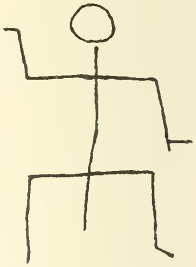

FIG. 6.

The pictures of the interesting quartet in the foreground of Fig. 7. are no doubt an attempt to portray the happenings at an obstetrical case; the figures are grouped together and are slightly removed from the rest of the pictures. Kahaluu, from its superior natural advantages, was the abode of many chiefs and kings (as the number of heiau in the vicinity would indicate), and this group may well have been intended to record the not uncommon occurrences in Hawaiian history such as mentioned by Fornander[10] in vol. ii, pp. 204 and 260. The length of the figures is 30, 18 and 20 inches.

To the south-west of the last group is another of three figures with rounded limbs placed in a row (Fig. 8). It has been not inappropriately suggested that these were three dancers, the arms of the smallest figure being properly placed for some of the movements of the *hula*. To the north and west are numerous other figures which have probably been added after the completion of the last group. However, there is nothing in the appearance of the gravings to be ascertained as to the comparative age. One figure should be noticed with the line of the trunk transversely broken by a segment of a circle (Fig. 9). The outlined-headed figure has its right foot connected with a small figure, 11.5 inches

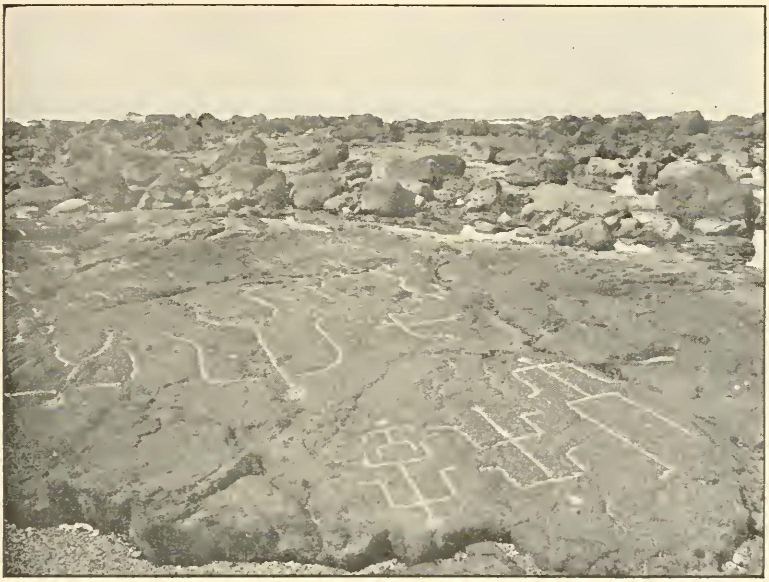

FIG. 7.

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[10] Polynesian Race.

long, depicted with a rectangular abdomen (Fig. 10). The headless figure directly below is 10.5 inches long. A little more to the west than the last is a curved-limbed figure with a broken-lined trunk and a line between the feet suggestive of a skirt (Fig. 11). In a number of cases the males are definitely marked, leaving it open to the suggestion that the unmarked figures must be females. But considering the number of unmarked figures, it does not seem reasonable to conclude that all these were females. Nevertheless the Hawaiians were children of Nature and were accustomed to regard her as she is. The woman's dress was the pa'u, a wrapping of tapa extending from the waist to the knee.

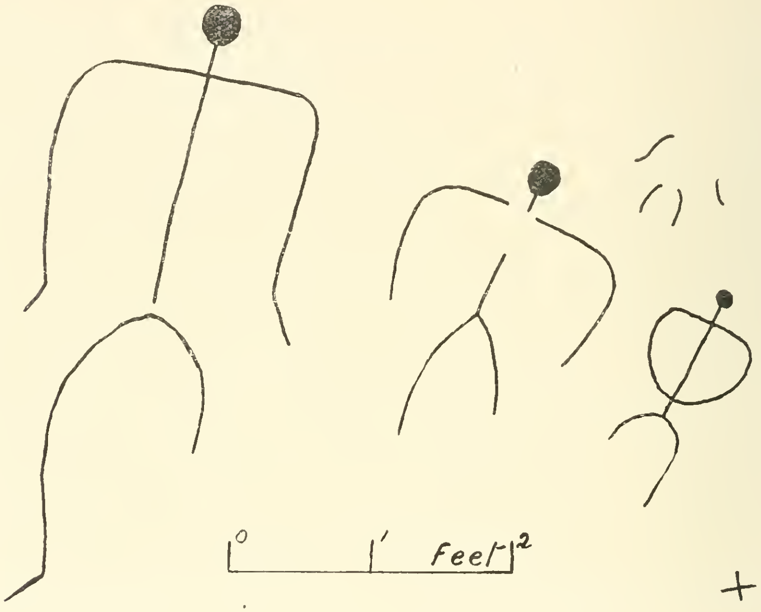

FIG. 8.

To the west of the hula group is a jumble of petroglyphs, the most interesting being the deeply incised figure of Kamalalawalu (Figs. 1, 12 and 13). It is more than probable that this figure was not always beheaded, as outlines of what may have been the lower part of the head are still traceable. Where the head should be there is a natural crack in the bed-rock which seems to have occurred since the graving of this and the surrounding carvings. It is believed that the Hawaiians did not practise decapitation. The figure is 10.5 inches long, with trunk and limbs represented by double lines of grooves .9 inch wide and .5 inch deep At its foot is a male figure with head and body outlined, the latter in oval form. On the east, other incomplete figures adjoin, one with an outlined head and dotted eyes and nose.

To the north of Kamalalawalu (Fig. 12), is another of the figures with an upraised arm, while to the west of the last is apparently a figure in profile. Petroglyphs in profile are so unusual[11] that it might be safer to consider this one incomplete, or the remains of one that has been worn down by the waves. Still further to the west is a graving (Fig. 14) 40 inches long which from peculiarities of its outline might at first seem modern. However, the graving is similar in all respects to those described above. Part of the head was seen, but does not show in the photograph. The abdomen is roughly rectangular with four upright or slanting strokes on the upper side. The feet are circles.

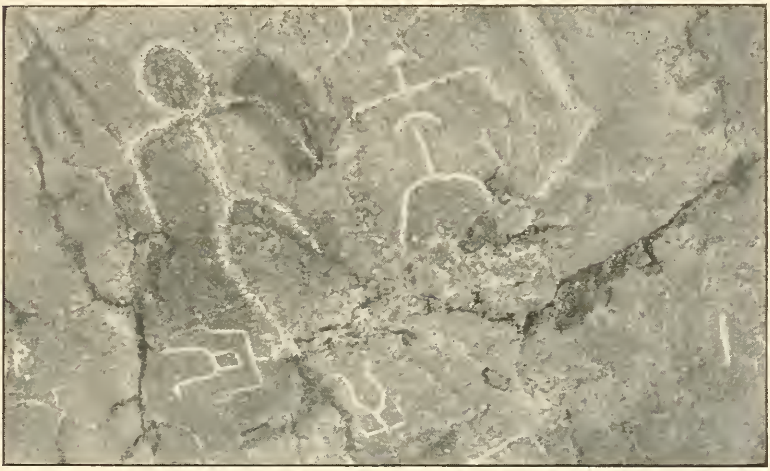

FIG. 9.

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[11] Certain stone carvings in profile have been previously referred to on pages 124 and 125 of this volume.

To the west and south-west of Kamalalawalu are other lined figures one of which (Fig. 15) is a phallic emblem, 21 inches long, which certainly does not seem modern. Through the fogging of the films, it has been necessary to trace these outlines.

To the south of the last is a male figure (Fig. 16) with two parallel disconnected lines for the trunk, and feet or toes represented by three disjointed strokes.

To the north and north-west, along the edge of the low mound of lava on which the petroglyphs were found, were other carvings (Figs. 17 and 18). One (Fig. 18), 33 inches long, had a flat shallow depression for a head, forearms turned inward and hands downward. No legs could be traced, but the trunk was represented by a long line interrupted by cup-marks, and a design the purport of which is now indefinite.

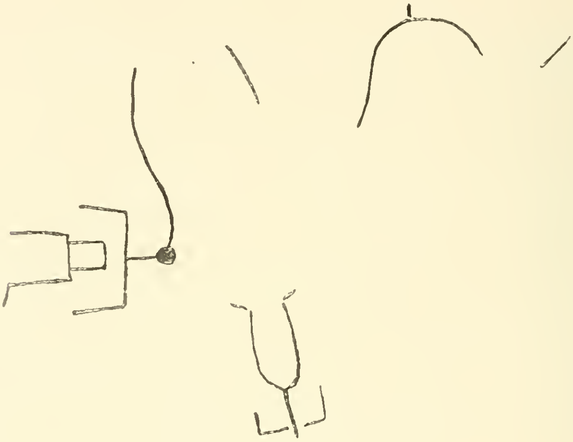

FIG. 10.

On another swelling of lava to the west (Figs. 19 and 20) is a very large unfinished figure; while some distance to the south is an attempt at another, with part of a name below it. These are unquestionably modern as the graving is very different from that described above, the peckings being still distinctly seen and the channels anything but smooth. They were, judging from appearances, made with a steel implement (perhaps a pick) the scars from which have been slightly rounded by the waves.

Nearer the sea than the last mentioned is an artificial bowl 8×3.5 inches cut in a flat rock, the use of which was not apparent.

The petroglyphs at Kahaluu lay pointing in all directions, but the majority headed towards the land, perhaps because it was more comfortable for the worker to face the mountains than the sea, or that the lava sloped upwards towards the shore. Nor was there much uniformity in the style of workmanship, only in some of the isolated groups of two or more figures did it appear that one artist had been responsible for more than one petroglyph.

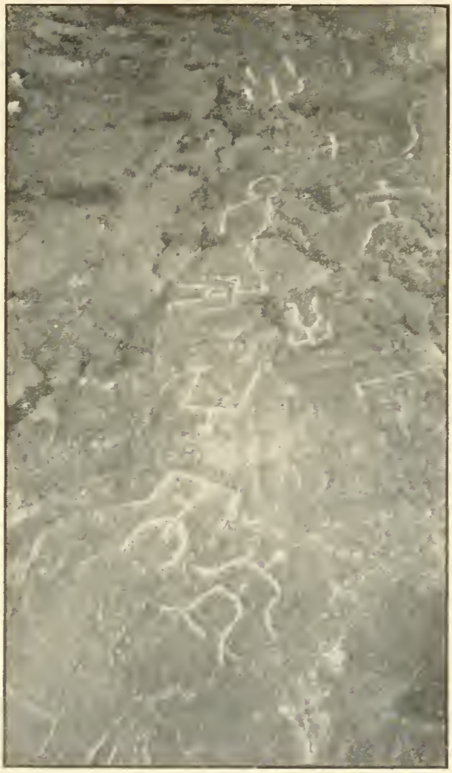

FIG. 11.

It will have been seen from the illustrations that the commoner forms at this place were figures with small cup-marked

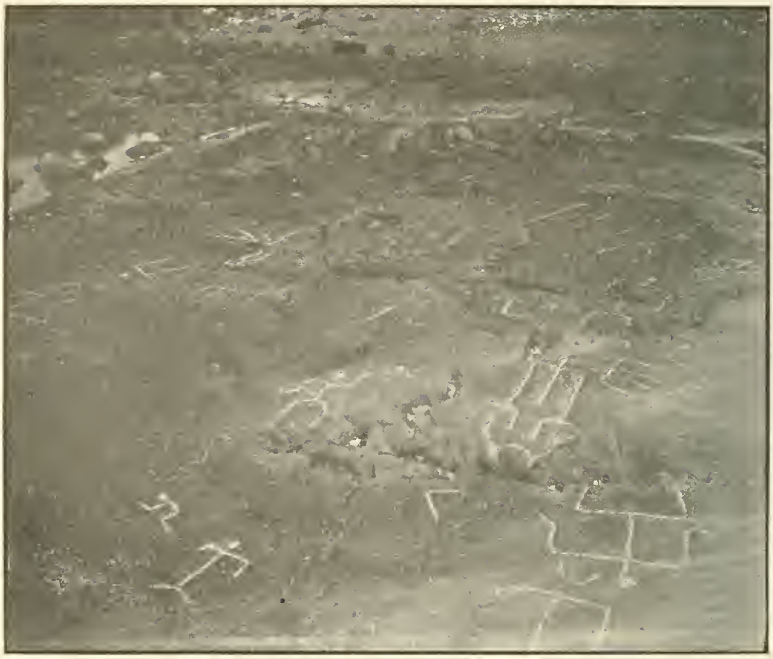

FIG. 12.

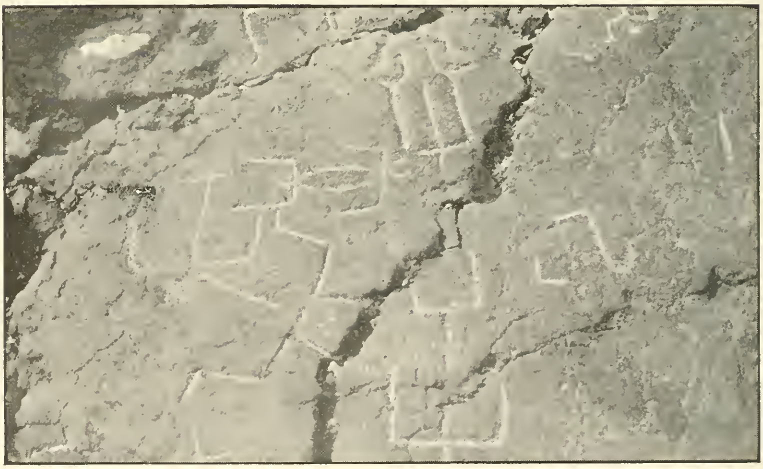

FIG. 13.

heads, single-lined bodies and angular or curved joints, which from present recorded discoveries might be called the typical forms. The triangular-bodied and four-legged figures were absent.

At the time of these investigations there was living in Kahaluu an old native named Malanui, eighty-six years of age, who, after the petroglyphs were marked, led the writer to the beach and pointed out the figure of Kamalalawalu. The other petroglyphs, when his attention was called to them, he declared he knew nothing of, and offered no suggestions. The following bit of history had been previously communicated by him, and is confirmed in part by Fornander.

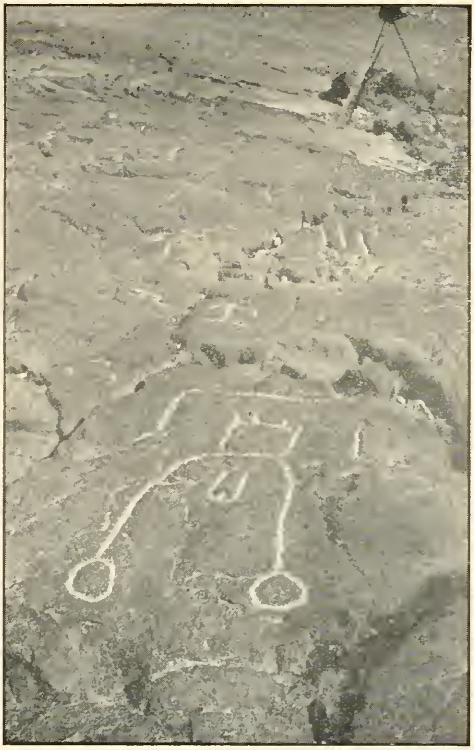

FIG. 14.

When Kamalalawalu, king of Maui, invaded Hawaii, Lono-ikamakahiki the king of Hawaii was in Kahaluu. On hearing of the landing near Kawaihae bay, Lono held a council of war at which two old priests presented the following plan: Lono was to disgrace them and drive them from court; they were to seek refuge with the enemy and confidence being gained advice was to be given that a march be made inland toward Waimea where they were to claim that Lono was in such a weak position that his defeat was certain. The plot succeeded, and while Kamalalawalu marched inland, Lono brought his forces along the coast from Kahaluu and cut off the retreat. Kamalalawalu was killed in the engagement that ensued. His body was brought to Kahaluu, a picture of it made on the rock, and the body sacrificed in the nearby heiau of Keeku.

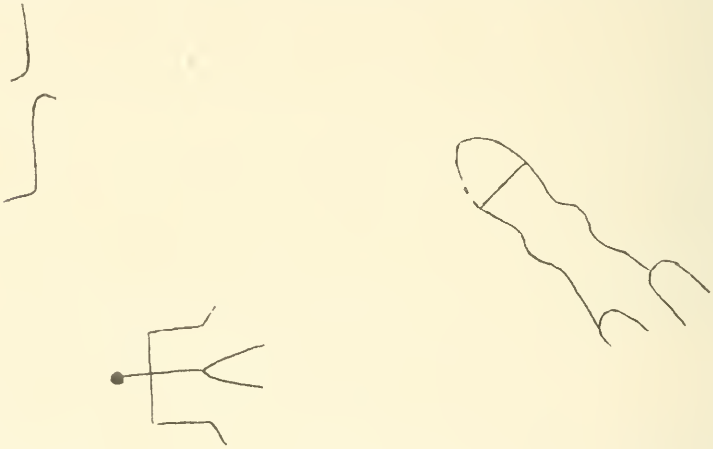

FIG. 15.

Fornander's account[12] of the main facts of the invasion is similar. Thrum,[13] who has been gathering legendary lore during the past forty years, has gleaned several accounts referring to the sacrifice—one, that it took place at the heiau of Ohiamukumuku, a quarter of a mile from Keeku; another that the Maui king was killed at Ohiamukumuku and his bones burned at Makole'a, another heiau one hundred yards from Keeku. The second was discredited by Thrum on account of other information which he had to the effect that the bones were saved and later returned to

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[12] Polynesian Race, vol. ii, p. 123.

[13] Hawaiian Annual, 1908, pp. 71 and 72.

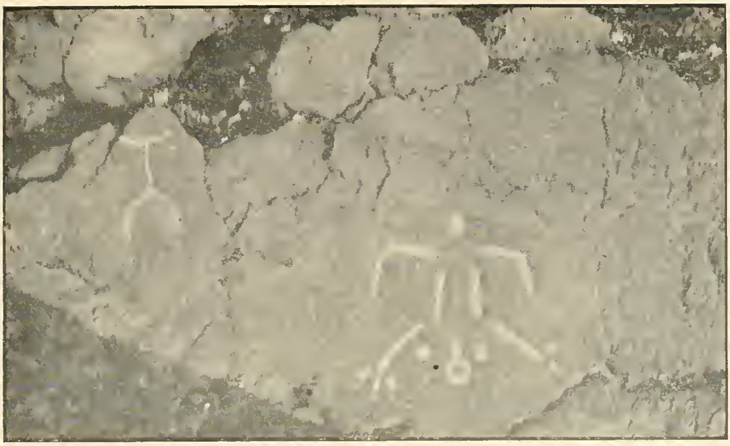
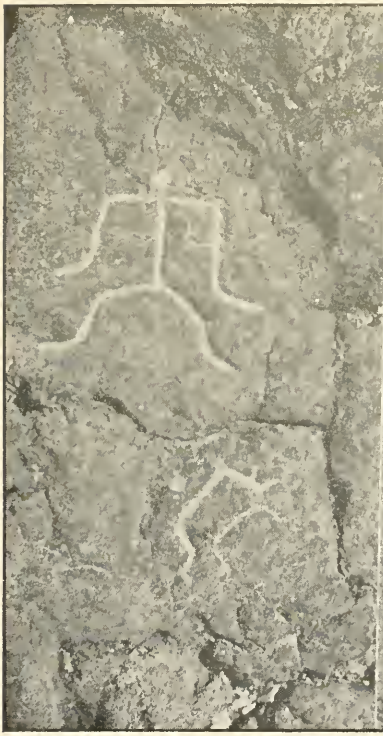


FIG. 16.



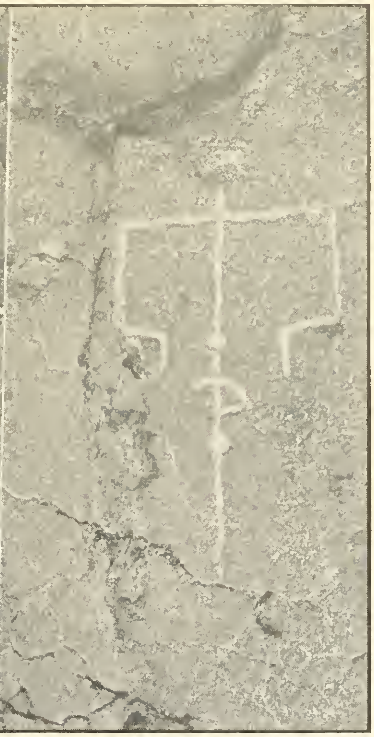
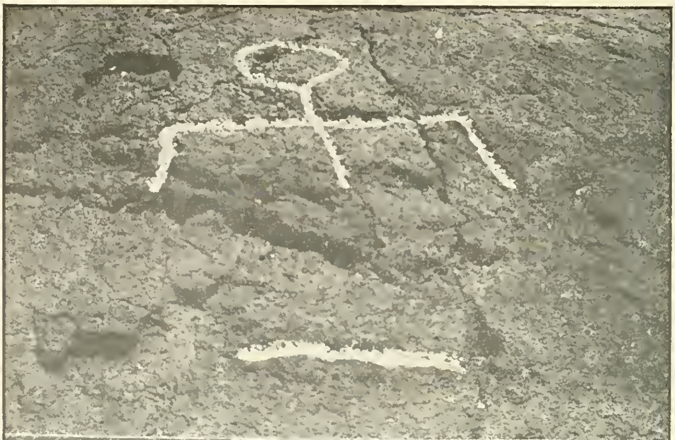


FIG. 17. FIG. 18.

Maui. Thrum also has information to the effect that the heiau of Keeku was purported to have been built by Kamehameha I, about two hundred years after the time of Lono-ikamakahiki.

Malanui was the grandson of the last priest of the neighboring heiau of Kapuanoni and was the only man met on Hawaii who could then give any information on the details of a heiau. He said that his knowledge was imparted to him by his grandfather and father. I have no reason to doubt the man's sincerity, as he was a Hawaiian of the old type, who neither drank nor smoked and was highly regarded by the other natives. On offer-

FIG. 19.



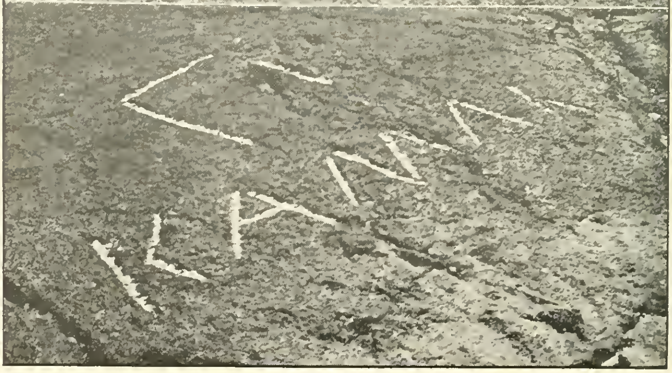


FIG. 20.

ing him a tip in as delicate a way as possible, he was much offended and explained that he gave me the information because he wished to assist the stranger, and begged me not to repeat the offer. He had lived in Kahaluu all his life. He also told me that King Kalakaua had tried to break off some of the petroglyphs to take them to Honolulu. A large quantity of rock had been removed from the swelling of lava on the land side, but there were no marks on the broken edge of cold chisels or steel tools, which would probably have been used for the work thirty years ago. It should be mentioned that the natives then living at Kahaluu referred to the figure of Kamalalawalu by that name.

At Palemano Point, Keei, near the heiau of Kamaiko and on the lava at the south side of Kealakeakua Bay, a petroglyph was found (Fig. 30, E) when searching for a triangulation station. This figure was hammered in much broader lines than usual; the channels were smooth, but the impression gained was that it was a modern piece of work.

When at Honaunau, many enquiries were made for the pictures on the rocks, and a story was told of a number of stars being carved on an immense upright slab, which had since been overturned by a tidal wave and then lay pictured side down. Farley[14] mentions petroglyphs at Honaunau representing Kamalalawalu and his dogs, but after many enquiries without success, the writer concluded that there had been confusion in the localities of Kahaluu and Honaunau, especially as Farley also said that Kalakaua tried to remove some. However, a number of people have since been met who have seen the gravings. Dr. N. B. Emerson of Honolulu described them to the writer as having triangular bodies.

Kau.—At Ka Lae, the south cape of Hawaii, no petroglyphs were seen, but information had previously been received from Mr. J. S. Emerson, formerly a government surveyor, that holes had been drilled by the natives in the rocks at the water's edge to provide moorings for their canoes. Each mooring was found to consist of two conical holes drilled near the edge, on the top and side of a boulder, at right angle to each other and meeting at about 2.5 inches from the surfaces. The holes tapered inward from a

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[14] Hawaiian Annual, 1898, p. 124.

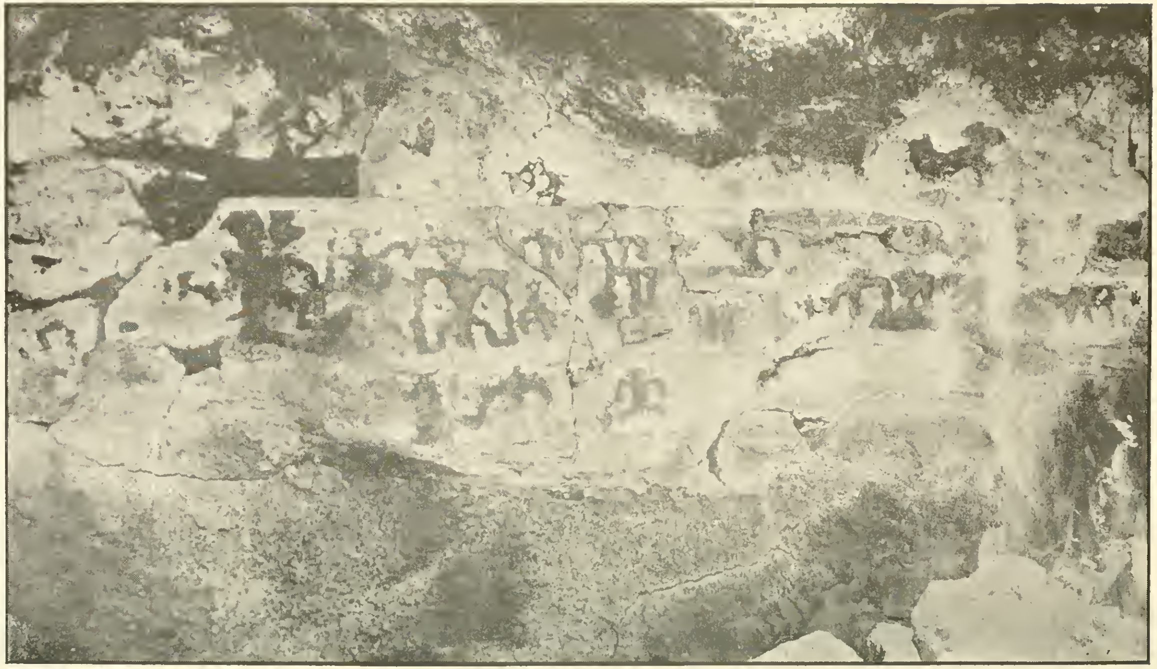

FIG. 21. PETROGLYPHS AT NAALEHU.

diameter of 2.5 inches to .5 inch, where they met. Four pairs of finished holes were seen, and one partly drilled.

In a cave on a mountain a little to the north-west of Waiohinu petroglyphs were reported, but the native engaged as a guide failed to appear, and consequently these were missed.

About two miles to the south of Naalehu on the east wall of a lava tunnel were found the petroglyphs (Figs. 21, 22) described by Westervelt.[15] The graving had been done by chipping away the white deposit on the surface of the black lava walls. This deposit, when hammered, crumbled irregularly, on account of which perhaps the workmanship lacked the symmetry and even finish noted at other places. Besides the more common single-lined forms, some with outlined and solid bodies may be noticed. In the middle of Fig. 22 may be seen a petroglyph of a male with three-toed feet. To the right of the middle of Fig. 21 are three short parallel strokes—an unusual occurrence, but noted elsewhere by Judd and Krämer.

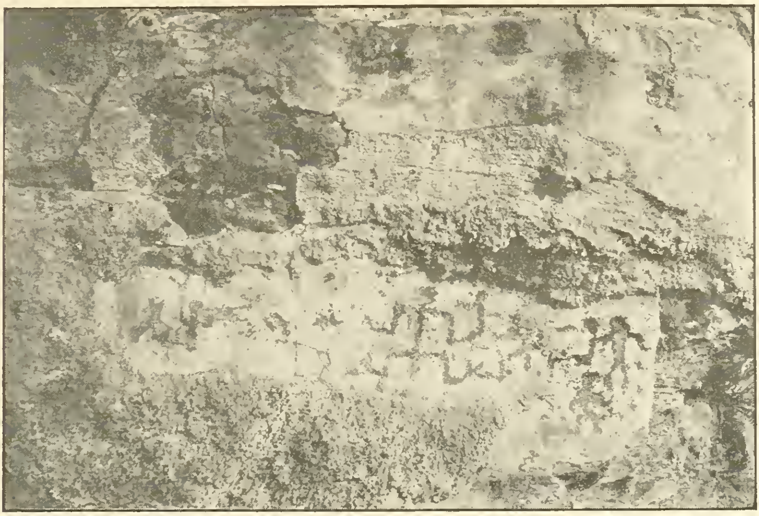

FIG. 22.

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[15] Hawaiian Annual, 1906, p. 164.

Scattered along the low lava shore between Ninole and Punaluu, and above the sea, were several small petroglyphs of the more common form. About two miles east of Punaluu and one hundred yards from the sea were several scattered groups (Figs. 23-28) within a radius of fifty feet, and not more than one hundred and fifty feet from the trail. They had been graven to a depth of .15 inch in the smooth portions of an old lava flow. The grooves were not smooth, the surface being brittle. Here for the first time the writer met with a definite animal form, in the figure of a fish 18 inches long (Fig. 25). A circle, 8 inches in diameter was also seen. It was this coast that Ellis referred to when describing the petroglyphs he saw, but the writer was not fortunate enough to find any of the semicircles or concentric rings. The

FIG. 23. FIG. 24. FIG. 25.

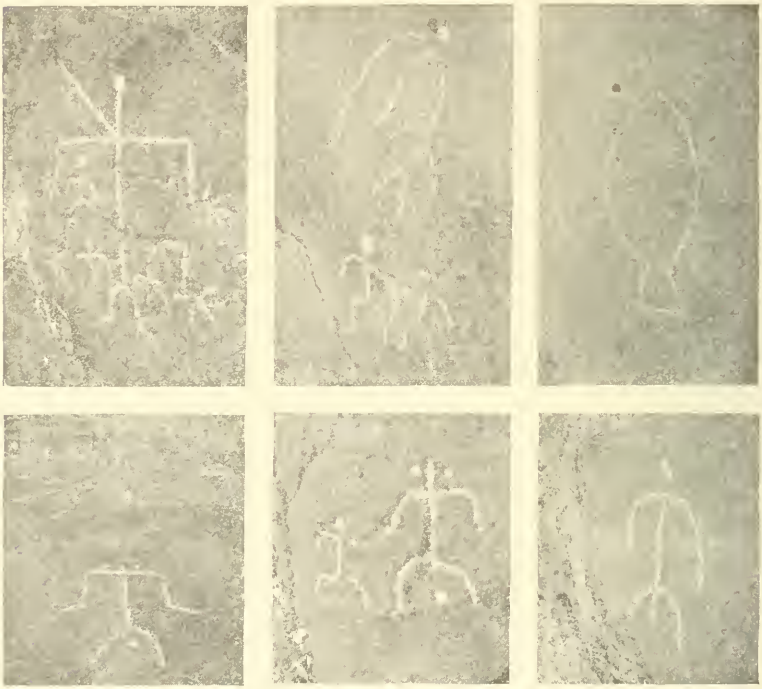

FIG. 26. FIG. 27. FIG. 28.

PETROGLYPHS NEAR PUNALUU.

carvings at this place were few, but novel. In Fig. 23 is one, 30 inches long, with five-fingered hands sheltering three small abnormally fashioned glyphs; at the base of its neck was a distinct line stretching above its right shoulder. It might tell the story of a large and valiant man struck with a spear while defending his children or less capable fellows. Another, Fig. 24, with its lower half omitted, reached down with a four-fingered hand in the direction of a pair of children. Two other petroglyphs in this environment, Fig. 27, 16 inches long and Fig. 26 are peculiar from the fact that eyes were represented without head outlines. The ancient native trail leading past this spot to Punaluu crossed a flow of *aa*. To add to the comfort of the barefooted traveler, a line of smooth water-worn stones had been placed on the sharp clinkers about two and one-half feet apart. On one of these stones a small graving was seen (Fig. 29). It is now in the Bishop Museum. The figure is of a common form, length 7 inches, but graved in shallower channels than is usual—only .05 inch deep. The head is .2 inch deeper. The slight depth may be accounted for by the extremely hard surface of the stone. To make the petroglyph distinct in the photograph, the finger was wetted and passed along the grooves of the figure before exposing the plate.

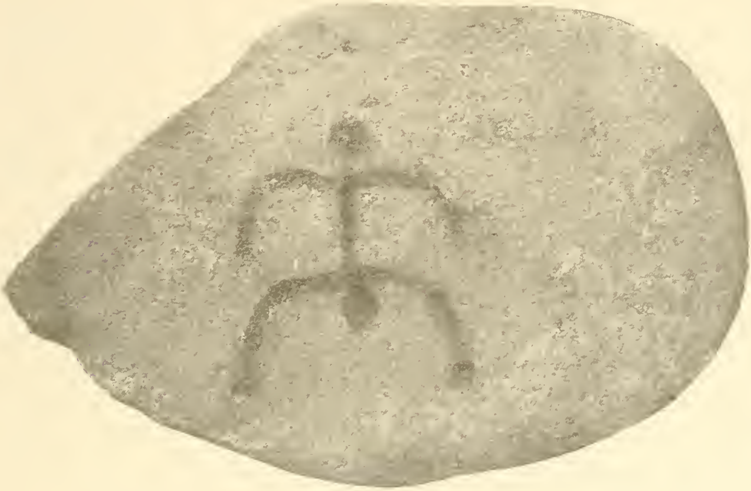

FIG. 29.

After leaving Punaluu, the writer passed through Pahala, but time was too limited to allow a search for, and examination of the petroglyphs discovered by Mr. Walton at the latter place to be made. However, Judd describes and illustrates a number of them.

Puna.—On the lower trail from Kau is a footprint, 16 inches long, clearly cut to the depth of .4 inch. It is well proportioned and shows the wide-spreading toes of the native foot undeformed by boots. It is known as Nihau's foot. A few other gravings were found near the spot, one to the south and off the road (Fig. 30, A), and three others along the trail to the east (Fig. 30, B, C and D). Continuing on the trail, distinct, but not very deeply cut, marks were observed which might have been intended for the chart of a constellation (Fig. 31). The group was about six feet long. Fornander frequently mentions that the Hawaiians had more than a passing knowledge of the heavenly bodies.

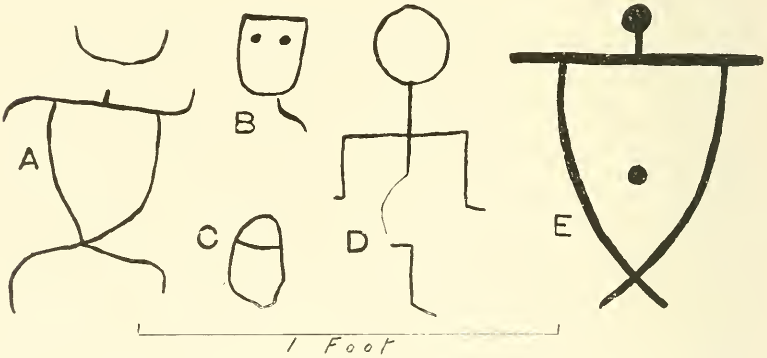

FIG. 30.

It had been reported that petroglyphs were to be seen at the heiau of Kukii in Kapoho, but Mr. Henry Lyman, who had spent a great part of his life at that place, had not seen them. However, he kindly showed me a natural crack in a rock, which he told me a previous visitor had claimed was an Aztec character.

Hilo.—Mr. Rufus Lyman informed the writer that on the Wailuku river, to the east of the "Potholes," an old native had shown him marks which were intended to represent the sun, moon and stars. This was more than thirty years ago, and to reveal them it was then necessary for the native to remove the earth and vegetation from the ledge of stone forming the bank of the stream. While working in the neighborhood the writer made an unsuccessful search for them.

Kohala.—At Puuanahulu in South Kohala, when passing along a trail late one afternoon, the remarkable sight of a couple of acres of pahoehoe closely covered with petroglyphs was experienced. The failing light necessitated time exposures with the camera, and as many photographs were taken as the few available minutes would permit (Figs. 32-39). Most unfortunately the time limit of the expedition had been reached and the writer knew that it would be impossible to return to the spot during that season. He was therefore reluctantly compelled to content himself with a very brief survey of the most interesting field before him and the intention to return and carry out an extended investigation at the earliest opportunity.

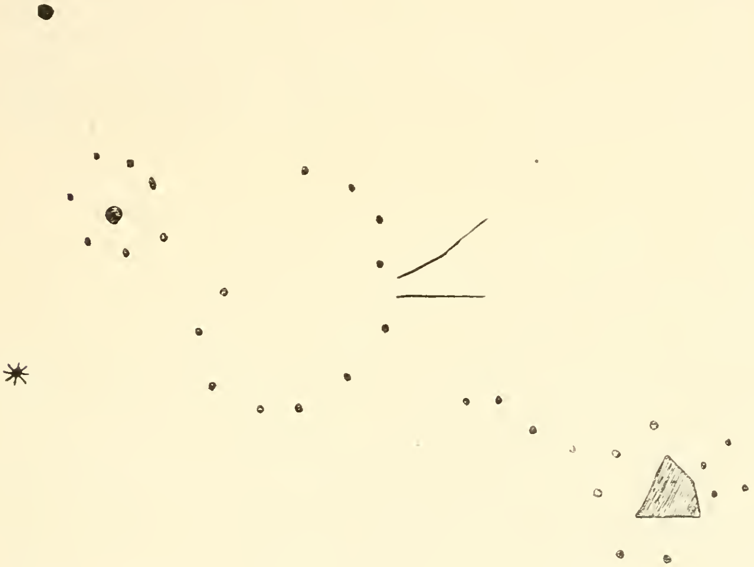

FIG. 31.

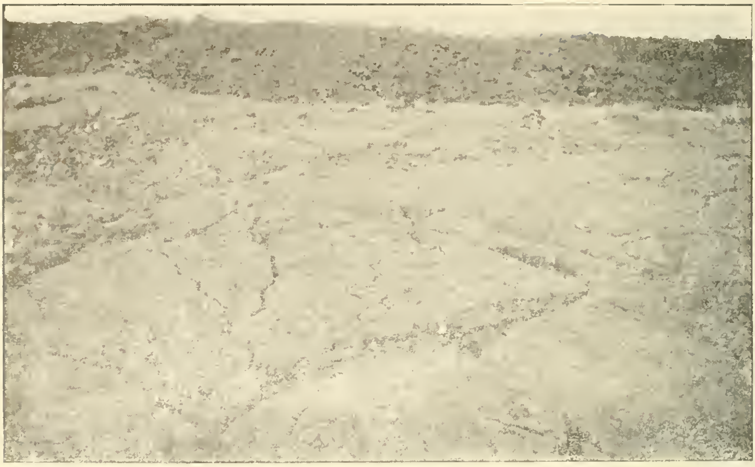

FIG. 32.

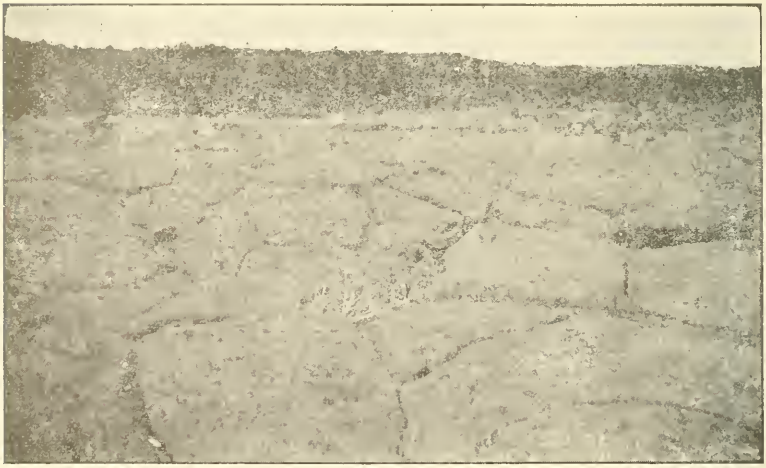

FIG. 33.

PETROGLYPHS AT PUUANAHULU.

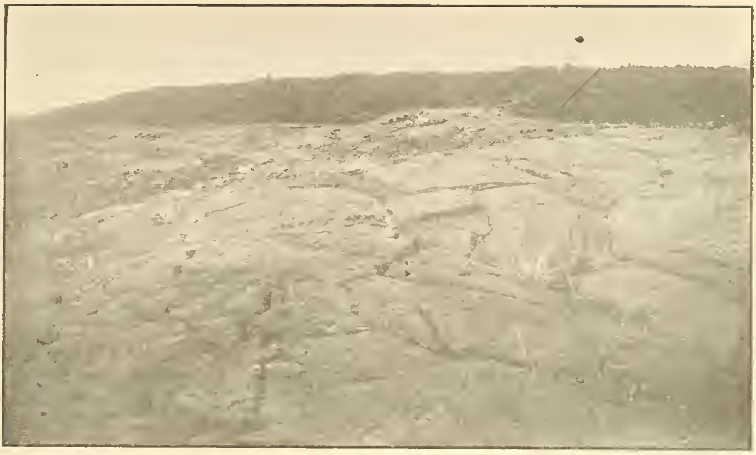

FIG. 34.

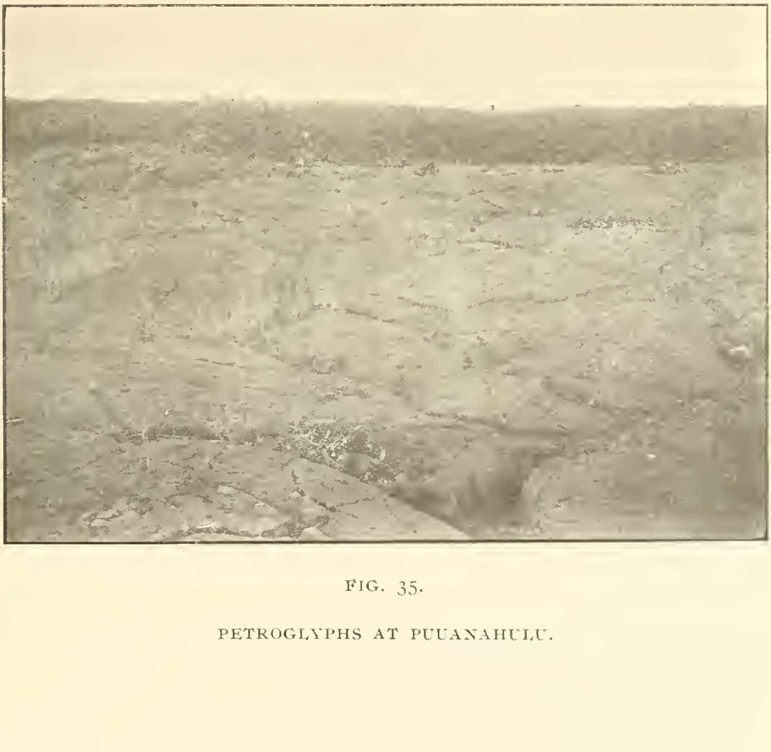

FIG. 35.

PETROGLYPHS AT PUUANAHULU.

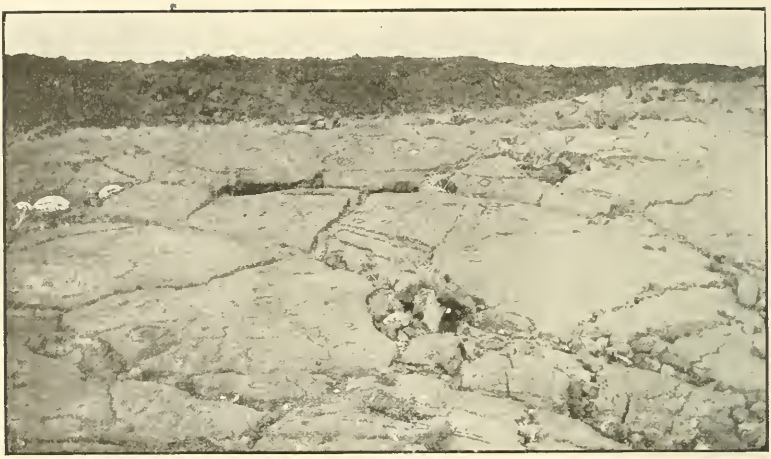

FIG. 36.

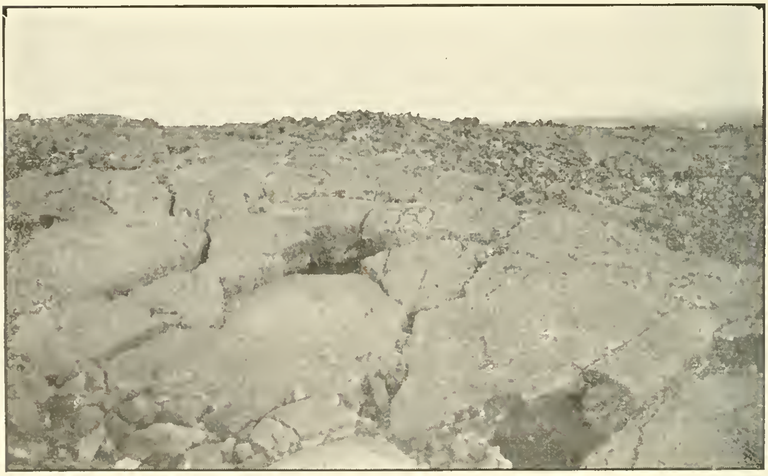

FIG. 37.

PETROGLYPHS AT PUUANAHULU.

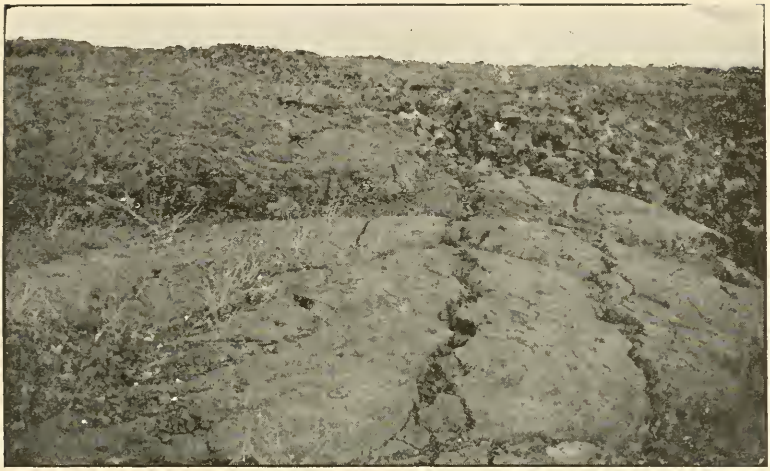

FIG. 38.

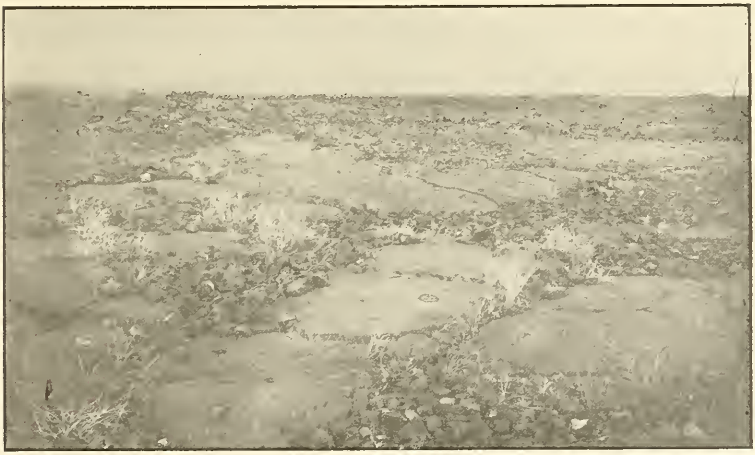

FIG. 39.

PETROGLYPHS AT PUUANAHULU.

With the careful study of the illustrations, many new forms may be seen. One striking peculiarity was the use of irregularly circular lines for the inclusion or separation of groups of petroglyphs, perhaps for the purpose of limiting or defining a particular record. There were forms innumerable, forms not suggestive of the human or animal, which from this grouping could leave but little doubt that they told a connected story. They left a strong impression that the Hawaiians had made a decided advance towards a written language. Ellis' concentric rings were here aplenty, and cup-marks, isolated and grouped. Mostly on the outskirts of this interesting area were many names of Hawaiians, sometimes dated, and more initials. It seemed to have been a time-honored place for recording events. The place had been isolated by the flow of lava in 1859 and is not easy of approach. It is doubtful if Ellis visited this spot, though he landed at "Wainanarii" (now unknown) two hours canoe journey from Kiholo. If we call this distance nine miles, it would mean that he landed within a mile of the petroglyphs. Ellis rested at "Wainanarii" a few hours, and merely mentioned that as it was Saturday he found the natives spending their time preparing for the Sabbath. It is most regrettable that Ellis did not continue his journey a little inland, as had that careful and accurate observer seen the petroglyphs at Puuanahulu, Hawaiian ethnology would probably be richer today by the explanations and views of the natives of his time.

Molokai.—Molokai was visited in the middle of 1909. At Puu Hakina, towards the south-west corner of the island, and about two miles north-west of Hale o Lono is a low, rocky hillock. On the top of the rise were three stones standing in line, each marked with shallow cut figures on the vertical side facing the south (Fig. 40). The figures were not marked before photographing. The index finger of the man holding the tape is one foot from the lower part of the wire. The most striking form in this series is that of a male on the middle stone; in addition to a wide, tapering trunk and twisted limbs, it has an oval loop reaching from the neck high above the head. Below these stones and about fifteen feet to the south is a terrace artificially walled up. Fig. 41 shows the wall faintly, and three men sitting on the graved stones. Mr.

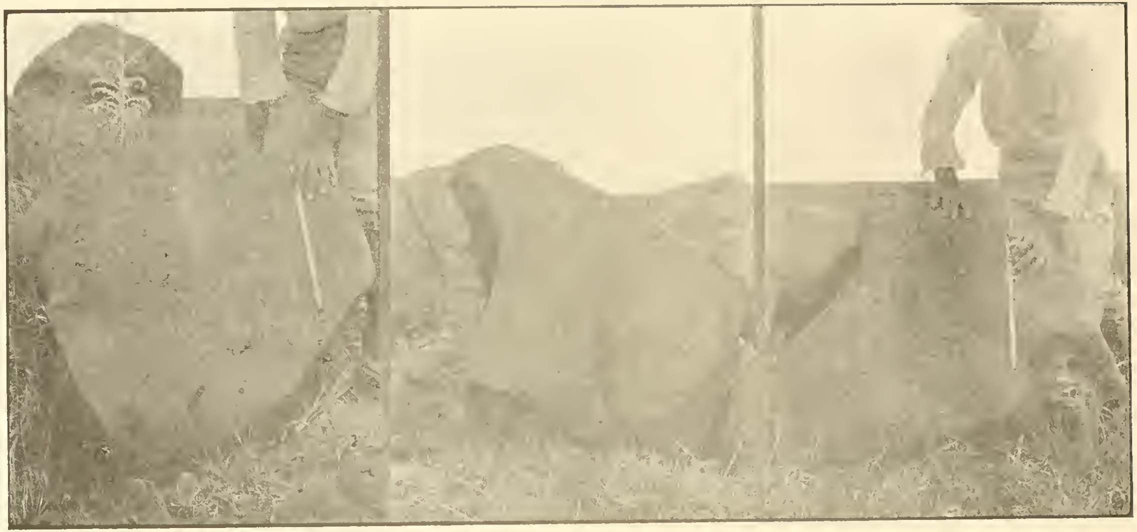

FIG. 40. PETROGLYPHS AT PUU HAKINA.

John Burrows, keeper of the lighthouse on the south-west cape, first noticed these figures in 1891, and said that they looked as distinct then as when he showed them to the writer.

Kalaina wawae (Figs. 42-45) were seen on an ancient highway along the north side of the island. The spot is one and one-half miles west of the Momomi huts and one-half mile from the sea. Here on a slope of air-formed sandstone were numerous oblong depressions, said to represent human footprints. The legend extant concerning the cause and origin of these marks, was to the effect that Kalaina, a prophetess (or as the narrator quaintly expressed it, a crazy woman) lived at Momomi nearby. One day she went to the trail and made two box-like hollows in its surface. The next day she called the people to the place and showed them her work. "See what I have done! Bye and bye people will come from the sea with feet like these." It is said that this announcement was a prophecy of the arrival of the boot-wearing Caucasian. On this account the place has since been known as Kalaina wawae—Kalaina's feet. Following this event, visitors from other parts of Molokai and the other islands of the group have been accustomed to leave their marks in similar form when traveling along the road. This account was received from one man. Another said that he had heard of the footprints being

FIG. 41.

made by visitors to Momomi from the rest of Molokai and the other islands.

If credence is to be given to these accounts, and there is no reason why it should not be, then a definite minimum limit of age can be placed on the origin of the custom.

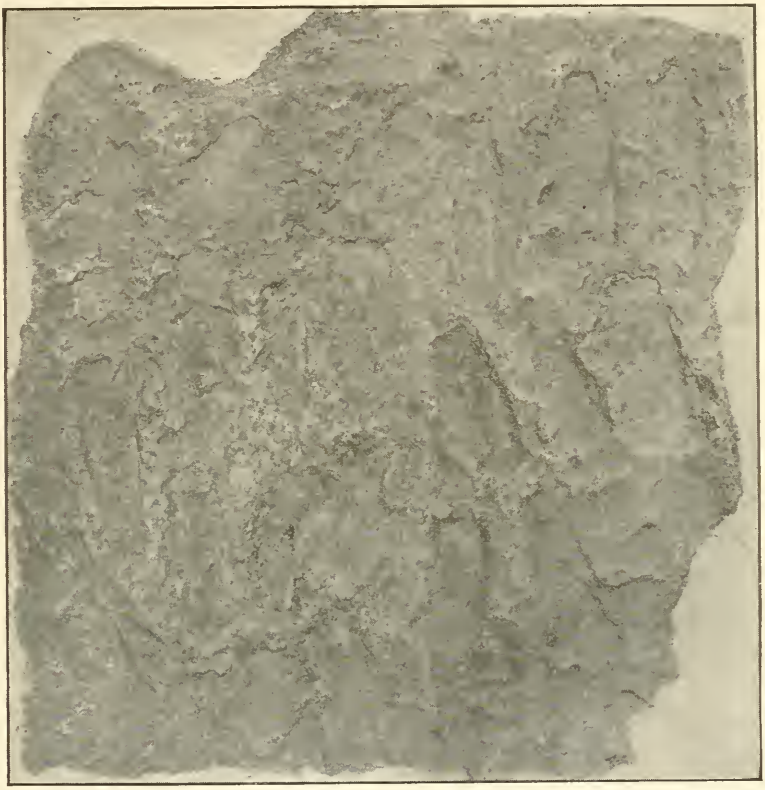

FIG. 42. SLAB OF SANDSTONE SHOWING "FOOTPRINTS."

An estimate of the number made, taken from the worn down and almost obliterated traces, would be above five hundred. Very frequently they were in pairs. The majority were just about 12 inches long, and none were found appreciably longer. There were quite a few 9 inches long, and one pair 4 inches long; in depth they varied from .5 inch to 2 inches. Toed "foot-prints" were only found in four instances, and one pair had deeper depressions at one end which might have represented heels of boots. In all but two instances noticed, the marks are hollows of such a shape and size as a native might make by outlining his or her bare foot (or sometimes sandal) on the sandstone and wearing down the enclosed area by hammering the surface with a hard substance. As one possible bit of evidence that the abrasion was done in the manner described it might be mentioned that a flat oblong piece of hard basalt (Fig. 46) was found on the trail among the "footprints." It was 5 inches long, 3 inches wide and 1.5 inches thick, with the ends worn and rounded as might well have been done by repeated blows on the sandstone. It weighed 25 ounces and rested comfortably in the hand as a striking implement. The sandstone, while soft enough six inches below the surface to be crumbled between the fingers, was yet too firm to be rubbed away by the hand where exposed to the weather. The surface was broken very readily, however, when pounded with a stone.

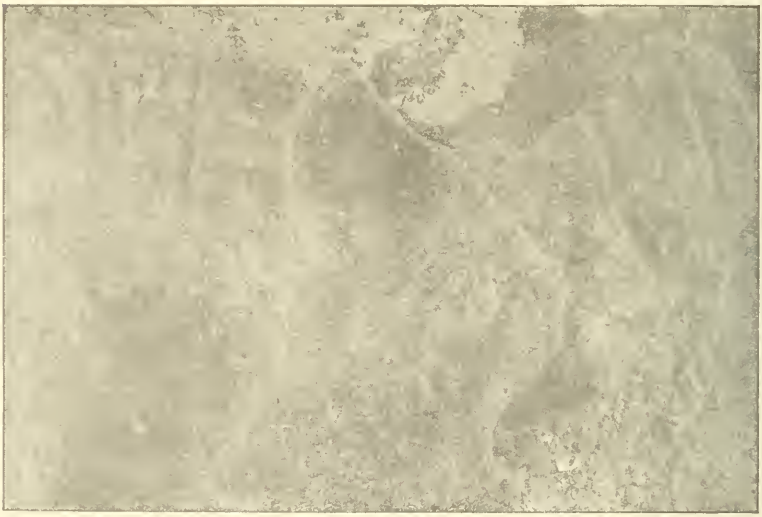

FIG. 43. OUTLINED "FOOTPRINTS."

The two exceptions noted above are feet merely outlined (Fig. 43) and not intended to be hollowed. The complete outline in the illustration is 12 inches long.

During the past forty or fifty years the ancient road has been mainly used by cattle traveling to and from the uplands on the west, and the animals' hoofs wearing down the sandstone have almost obliterated the majority of the carvings. Fortunately a little to the south side of the trail, several blocks of the footprints were found in comparatively good condition, and through the kindness and assistance of Mr. Geo. P. Cooke, the manager of the Molokai Ranch on whose property the trail lies, three slabs (Figs. 42-44) were cut out and sent to the Bishop Museum. A fourth (Fig. 45) was left, walled in, as it was considered impracticable to remove it with advantage on account of its size and the crumbly condition of the stone.

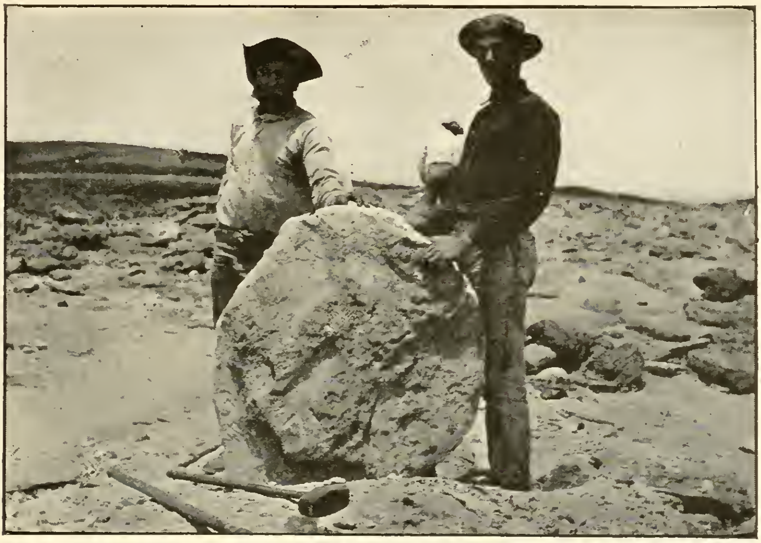

FIG. 44.

Judd refers to these footprints, and also faint remains of petroglyphs representing the human form. Trace of only one was seen by the writer, but a visit at a different time of day with a slanting light would probably give more. It was somewhat pleasing to note an absence of names and initials.

About the middle of the north side of Molokai is a hill called variously Kaulana-hoa by Fornander, Puu Nanahoa by Brigham and Judd, Puu Lua by the Government Survey. A number of boulders cover the top, and on them are many faint petroglyphs. Fornander[16] saw in two of them the double trident of Siwa, and on this account associated the gravings with phallic worship. I cannot say that Fornander's surmise is not correct, but the figures I saw looked more like the representation of a male with raised arms. Krämer and Judd describe and illustrate a number of the petroglyphs, adding to the forms already noted herein, figures with six limbs.

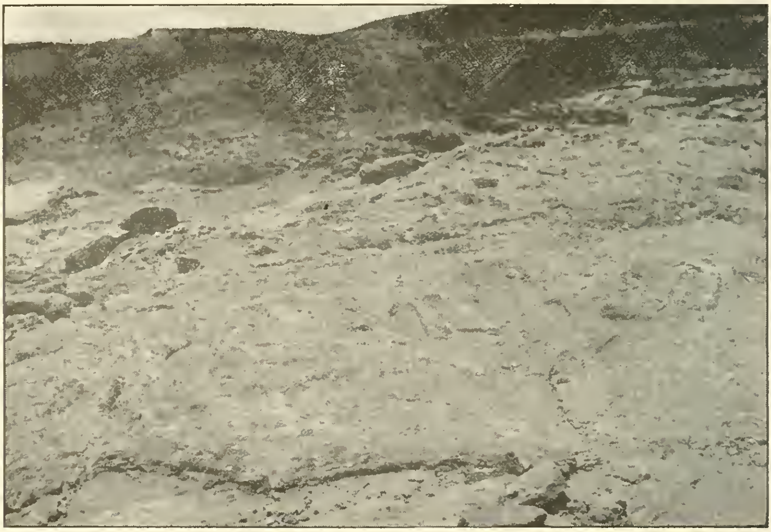

FIG. 45.

Oahu.—Thrum and Judd[17] describe petroglyphs on the ceiling and floor of a sea-worn cave (Fig. 47) in the tufaceous side of Koko crater, at the east end of the island. Since then one of the figures has been cut out and removed. There is a smaller cave in the same hill, one-quarter of a mile to the south, and on the ceiling of this is part of one of the common form of carvings.

At Helemano, in Waialua, Mathison saw a stone covered with petroglyphs, of which he gives an illustration of a draw-ing taken on the spot. A copy may be seen in the Hawaiian Annuals for 1898, page 122, and 1904, page 180. While some of the pictures may pass for Hawaiian work, others do not resemble anything yet noticed in this group, nor in Mallery's splendid record of pictographic writing. A cannibalistic foreigner is reputed to have used this stone as a platter, and Dr. Alexander, a noted authority on Hawaiian history, expressed the opinion to the writer that the man was a Marquesan. Petroglyphs found in those islands may throw some light on the subject. The stone is believed to have been demolished in 1895.

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[16] Polynesian Race, vol. i, p. 50.

[17] Hawaiian Annual, 1900, p. 126; 1904, p. 179.

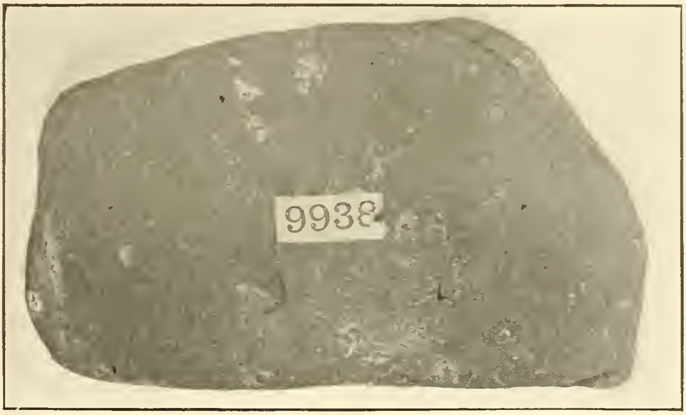


FIG. 46. STONE FOR MAKING "FOOTPRINTS."

Kauai.—From this island come interesting accounts by Farley and Judd of petroglyphs on the beach at Keoneloa, near Koloa. Farley counted seventy-six figures measuring from 1 to 6.5 feet, and Judd later observed others which brought the maximum measurement up to 7 feet. These do not by any means constitute the entire number at that place, as it is reported that there are still large tracts of petroglyphs covered by the beach sand. Those examined had been laid bare by the waves during a storm. Farley also gives an account, by an old Hawaiian woman, of these having been seen by her in 1847 when accompanied by her school teacher, her fellow pupils and two Roman Catholic priests, and of the existence of figures of birds and fish, and an un-Hawaiian vessel with strange animals in it. The investigations carried on at that time, according to the old woman, resulted in the information being gathered that, while the Hawaiians of the day had seen the pictures, they neither knew who made them, nor why they were done.

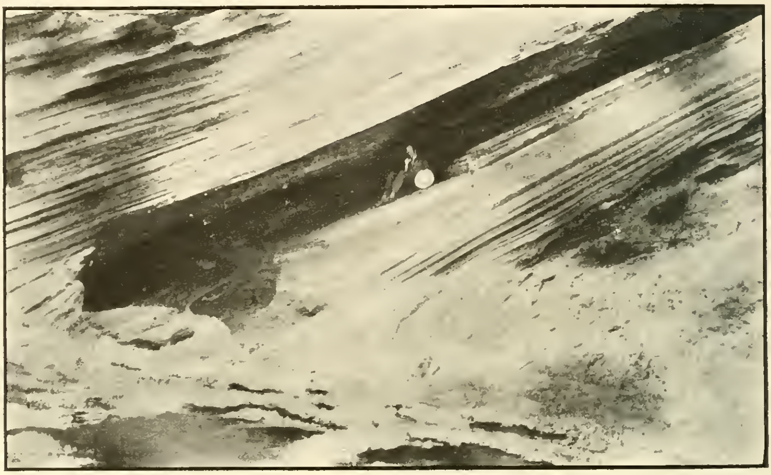


FIG. 47. SEA-WORN CAVE ON EAST SIDE OF KOKO CRATER.

Through the kindness of Mr. Judd, rubbings of five figures on the rocks at Papalinahoa, Nawiliwili Bay, made by his brother Charles in 1906, have been given to the Museum, and are illustrated herewith (Fig. 48). Two of these five are particularly striking, viz., "D" armless, and with the outlines of the triangular body not joining at the hips, but continued into the legs; and Fig. "A" with the bulbous solid trunk also armless. The latter may represent a male, or an idol carried on a pole.

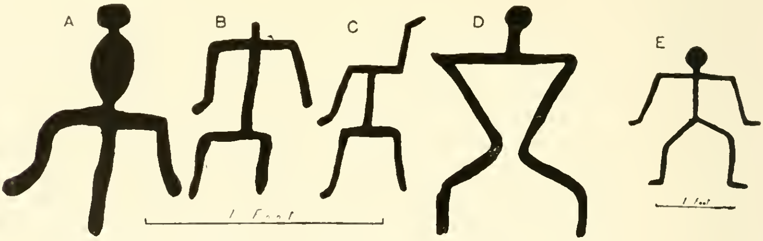


FIG. 48. PETROGLYPHS FROM NAWILIWILI BAY.

I am indebted to Dr. E. S. Goodhue of Hawaii, formerly of Kauai, for the information that there is a sculptured rock on the southern side of Kauai, inland. For those who may be interested and live near the spot, his directions are repeated. The stone is large and conspicuous, about one hundred and fifty feet *makai* of the road from Koloa to Eleele, on the Koloa side of the road and on the top of the hill going down into Lawai gulch. It is about opposite the juncture of the Lihue and Koloa roads.

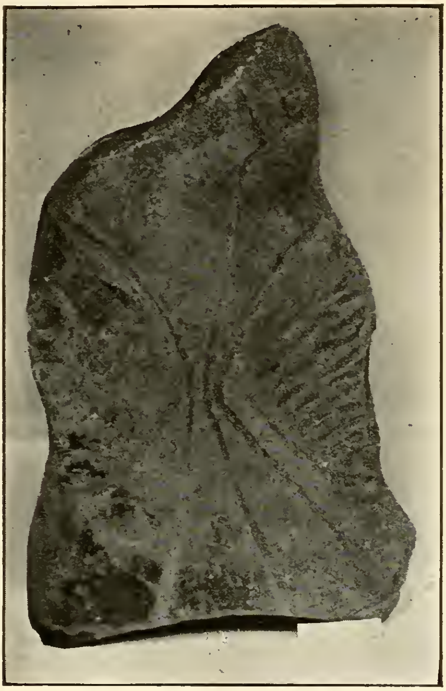


FIG. 49. PETROGLYPHS FROM TUBUAI, AUSTRAL IDS.

Niihau.—Judd mentions petroglyphs at a place called Kii.

From the Polynesians, excepting the New Zealanders, Easter Islanders and Hawaiians, the writer has information of but two specimens of rock-carvings. Fig. 49 will show a slab of compact basalt, twenty-five inches long and four thick, from Tubuai, Austral Islands, collected for the Museum by Mr. Seale in 1902. The channels are .1 inch deep and .6 inch wide, and had been slightly scratched by a pointed tool (as may be seen in the illustration) before the specimen reached the Museum. It was broken from the smallest of a circle of upright stones, all similarly graved. The surface of the stone has been bleached to a depth varying from .1 to .3 inch by weathering and makes a strong contrast with the almost black stone showing at the broken edge. The bleached part is naturally softer than the interior, and if this skin had been penetrated by the graving in order to bring out the contrast of the dark and the light, the weather has since made the whole surface uniform.

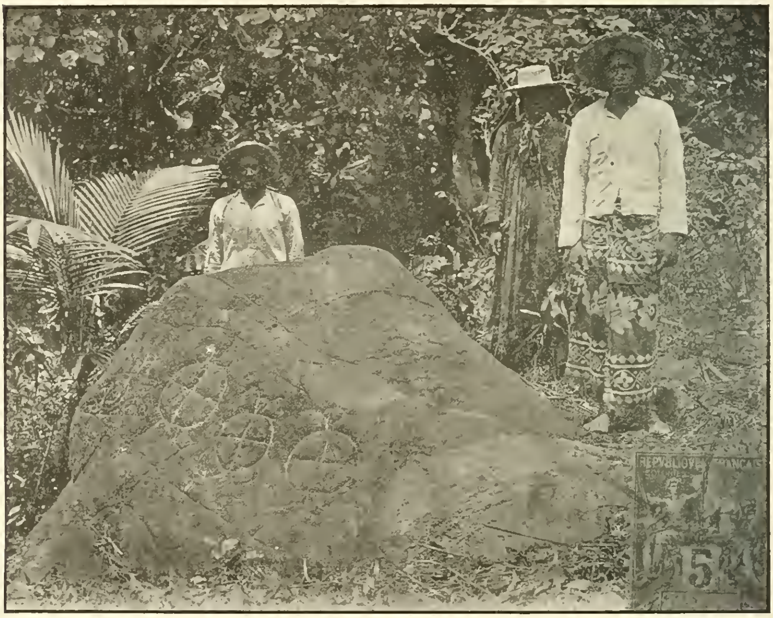


FIG. 50. PETROGLYPHS FROM BORABORA, SOCIETY ID.

The other instance is of several petroglyphs on a large stone in Borabora, Society Islands. A postal card illustrating these was given to the writer, in answer to enquiries for rock-carvings in the South Pacific, by an officer of the French cruiser "Protet," and I much regret that his name has slipped my memory. These petroglyphs (Fig. 50) show a workmanship which seems to far surpass that of the Hawaiians, and it is hoped that some investigation may soon be carried on in this interesting field, if it has not been done already. All the literature relating to the southern islands, which has so far been delved into, is silent on the subject.

At the present stage of investigation of Hawaiian petroglyphs and with meagre information concerning them gleaned from native sources, it seems premature to attempt an explanation of the objects or uses to which these primitive or literary efforts may have been applied.

New Hawaiian Plants.—II.

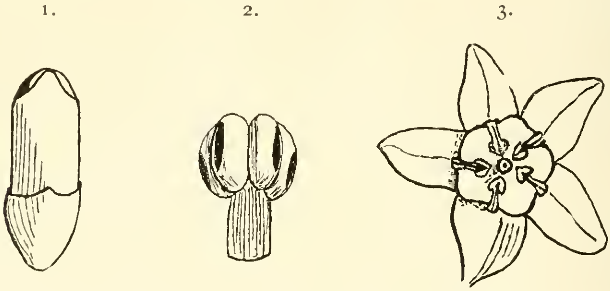
CHARLES N. FORBES.

APRIL, 1910.

Exocarpus luteolus, sp. nov.

Frutex 2–18 cm. altus; foliis cuneatis, coriaceis, subsessilibus, 2.5–5.5 cm. longa, 1.5–2 cm. lata; spicis 3.8 cm. longis. Perianthium viride, lobis acutis. Capsula cylindricalis, 1 cm. longa, apice acuto.

Type locality, wet places in and bordering the Wahiawa swamp, Kauai. Elevation, 2000 feet. Specimens were first sent by Mr. J. M. Lydgate in May, 1908. The type is No. 260. Forbes & Lydgate, August, 1909.

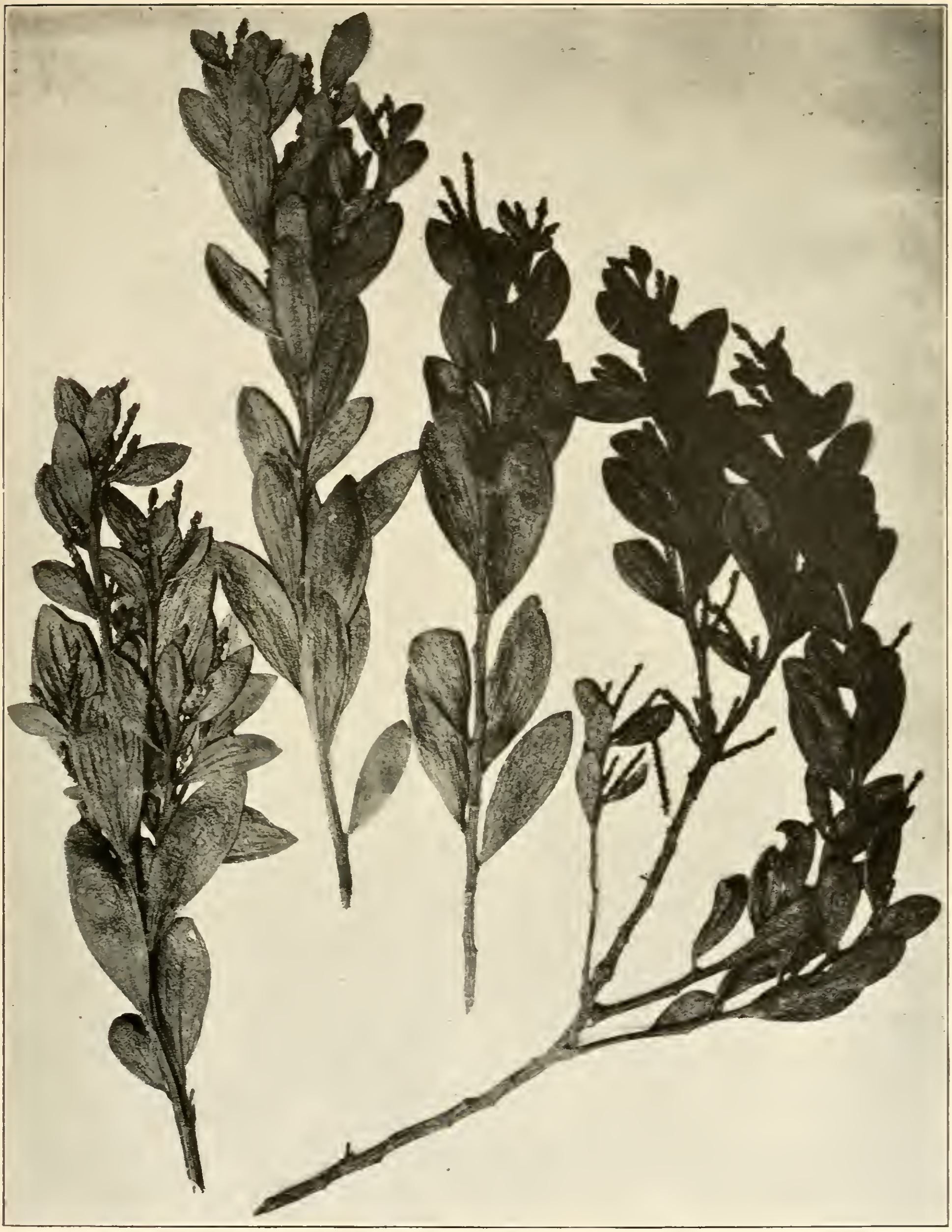


DIAGRAMS OF EXOCARPUS LUTEOLUS FORBES.

1. Fruit. 2. Stamen. 3. Flower. All variously enlarged.

A shrub two to six feet high. Leaves cuneate to oblong-lanceolate, inclined to be concave, thick coriaceous, subsessile, yellowish-green, veins rather indistinct, 12–24 × 7–9 lines. Spikes 1.5 inches long, four- to nine-flowered with many empty bracts below. Perianth very small, greenish, five- to six-parted; its lobes acute, one-half of a line long. Nut cylindrical, nearly five lines long, pointed at the apex with four indentations.

In many respects this species seems to be intermediate between *E. Gaudichaudii*, A. DC., and *E. brachystachys*, Hillebr. It differs in its much longer spikes, and in having only expanded leaves, these being stiffer, of a more yellowish green, usually smaller and of a different shape than those of *E. brachystachys*



EXOCARPUS LUTEOLUS FORBES.

Summary of the Collection of Insects in the Museum.

By Otto H. Swezey, M.S.

The Bishop Museum portion of the insects collected by Dr. R. C. L. Perkins has hitherto been stored in the original boxes in which they were returned from England, after having been worked up, but during the years 1908 and 1909 they have mostly been transferred to exhibition drawers of the Museum cases at the north end of the first gallery of Hawaiian Hall, where they are convenient of access to those wishing to see or study them. Additional instalments were received during 1909, and these are as yet retained in store boxes. The *Hemiptera* have not yet been received, and there are possibly a few yet to come of some of the other orders. Those on hand at present are summarized on the following page.

A small exhibit of unnamed Japanese insects given by Mr. G. P. Wilder comprises the following: *Hymenoptera*, 34 specimens; *Lepidoptera*, 259 specimens; *Coleoptera*, 158 specimens; *Hemiptera*, 15 specimens. Total, 466 specimens.

SUMMARY OF THE COLLECTION OF INSECTS IN THE MUSEUM.

Summary by Families.	Number of Specimens.			Number of Species.	
	In Collection	On Exhibition	In Storage	In Collection	In F. Hawaiiensis
HYMENOPTERA—					
Formicidæ	173	107	66	16	20
Apidæ	33	12	21	5	4
Prosopidæ	475	392	83	41	52
Eumenidæ	774	503	271	71	86
Vespidæ	16	6	10	3	3
Crabronidæ	318	271	47	17	21
Trypoxylonidæ	31	11	20	3	2
Mimesidæ	59	48	11	8	10
Sphegidæ	3	3		1	1
Bethylidæ	157	157		8	18
Proctotrypoidea	4	4		1	8
Cynipoidea					9
Chalcidoidea	92	92		18	44
Ichneumonoidea	113	101	12	26	49
LEPIDOPTERA—					
Caradrinidæ	104	104		25	39
Plusiadæ	116	116		11	15
Hydriomenidæ	62	62		7	17
Selidosemidæ	290	290		24	37
Sphingidæ	11	11		3	7
Nymphalidæ	41	41		5	5
Lycænidæ	19	19		2	2
Phycitidæ	27	27		4	7
Galleriadæ					1
Crambidæ	5	5		3	8
Pyraustidæ	587	587		115	169
Pyralididæ	2	2		1	2
Pterophoridæ	21	21		6	6
Orneodidæ					2
Gelechiadæ	65		65	18	45
Oecophoridæ	6		6	1	1
Hyponomeutidæ	571		571	160	276
Carposinidæ	95		95	23	33
Tortricidæ	96		96	22	49
Tineidæ	47		47	11	27
DIPTERA—	141	141		62	180
NEUROPTERA—					
Odonata	223		223	25	29
Hemerobiidæ	197		197	32	54
Psocidæ	85		85	19	25
Termitidæ					2
Embiidæ					1
COLEOPTERA—					
Carabidæ	1859	1859		143	210
Cerambycidæ	504	504		40	54
Curculionidæ	701	565	136	84	137
Scolytidæ	15	15		11	26
Proterhinidæ	1603	1037	566	108	122
Anobiidæ	1636		1636	67	*
Elateridæ	234		234	40	81
Dermestidæ	49		49	16	26
Nitidulidæ	891		891	94	143
Histeridæ	69		69	28	38
Staphylinidæ	260		260	44	119
Cioidæ	296	296		31	42
Miscellaneous Families	321	127	194	72	108
ORTHOPTERA—					
Dermaptera	89	89		6	7
Blattodea	36	36		10	15
Acridoidea	4	4		1	1
Locustodea	30	30		10	13
Gryllodea	127	127		24	36
Totals	13,783	7,822	5,961	1,626	2.544
Summary by Orders.					
Hymenoptera	2248	1707	541	218	327
Lepidoptera	2165	1285	880	441	748
Diptera	141	141		62	180
Neuroptera	505		505	76	111
Coleoptera	8438	4403	4035	778	1106
Orthoptera	286	286		51	72
Totals	13,783	7.822	5,961	1,626	2,544

* Not yet published.

PUBLICATIONS OF THE BERNICE PAUAHI BISHOP MUSEUM

(All previous price lists are hereby cancelled.)

A Handbook for the Bishop Museum. Oblong octavo, 94 half-tone illustrations. Price 25 cts., postage 9 cts.

Index to Abraham Fornander's "Polynesian Race." By John F. G. Stokes. Price $1.75, postage 5 cts.

Occasional Papers, Vol. I. Octavo.

No. 1. Director's Report, 1898. Visits to Ethnological museums in a journey around the world. [Out of print.]

No. 2. Director's Annual Report, 1899. Mat Sails of the Pacific—Stokes. Ray-skin Rasps—Walcott. Notes on the Birds of Oahu—Seale. Price 50 cts., postage 4 cts.

No. 3. Director's Annual Report, 1900. Visit to the American museums—Stokes. Mission to Guam—Seale. Notes on the Birds of Kauai—Bryan and Seale. Price $1.00, postage 8 cts.

No. 4. New Hawaiian Fishes—Seale. Price 25 cents; postage 2 cts.

No. 5. Director's Annual Report, 1901, and Index to Vol. I. Illustrations of sperm whale and bird groups. Price 50 cts., postage 4 cts.

Occasional Papers, Vol. II.

No. 1. Director's Annual Report, 1902. Noteworthy Hawaiian Stone Implements—Brigham. Fibres of the Hawaiian Islands—Blackman. Distribution and Variation of Achatinella multizonata—Cooke. Monograph of Marcus Island—Bryan. Price $1.00, postage 7 cts.

No. 2. Director's Annual Report, 1903. Remarks on Phallic Stones from Rapanui—J. L. Young. Aboriginal Wooden Weapons of Australia—Blackman. Price 40 cts., postage 4 cts.

No. 3. Director's Annual Report, 1904. Australian Bark Canoe—Brigham. A Stone Dagger for Duelling—Brigham. Notes on the Birds of the Waianae Mountains—Bryan. Additional Notes on the Nesting Habits of the Hawaiian Owl—Bryan. Description of the Nest and Eggs of Chlorodrepanis virens (Gmel.)—Bryan. Notes on the American Birds Collected in the Hawaiian Islands by Mr. Gerrit Wilder—Bryan. A Bird's Nest of Pele's Hair—Bryan. Two Undescribed Nests and an Egg of a Hawaiian Bird—Bryan. Price 50 cts., postage 5 cts.

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No. 5. Director's Annual Report, 1906, and Index to Vol. II. Dr. Cooke's Report on Types of Hawaiian Land Shells. Price 20 cts., postage 2 cts.

Occasional Papers, Vol. III.

No. 1. Reprint of Original Descriptions of Achatinella. By E. W. Thwing. Price $1.50, postage 9 cts.

No. 2. Notes on Hawaiian Land Shells—Pilsbry and Cooke. Price 25 cts., postage 2 cts.

(OVER)

PUBLICATIONS—Continued.

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No. 1. Fishes of the South Pacific—Seale. Price $1.00, postage 5 cts.

No. 2. Director's Annual Report, 1907. Casts of Hawaiian Fishes, made by John W. Thompson. Stone Sculpturings in Relief—Stokes. Some Birds of Molokai—Bryan. Price 75 cts., postage 5 cts.

No. 3. Director's Annual Report, 1908. Walled Fish Traps of Pearl Harbor—Stokes. Some New Hawaiian Plants—Forbes. Price 40 cts., postage 3 cts.

No. 4. Director's Annual Report, 1909. Hawaiian Curved Adzes—Brigham. Notes on Hawaiian Petroglyphs—Stokes. New Hawaiian Plants, II—Forbes. Insects in the Museum—Swezey. Price 85 cts., postage 5 cts.

Memoirs, Vol. I. Quarto.

No. 1. Hawaiian Feather Work. By Wm. T. Brigham. Price $2.50, postage 14 cts.

No. 2. Index to the Islands of the Pacific. By Wm. T. Brigham. Price $1.50, postage 20 cts.

No. 3. Key to the Birds of the Hawaiian Group. By Wm. Alanson Bryan. Price $1.50, postage 13 cts.

No. 4. Ancient Hawaiian Stone Implements. By Wm. T. Brigham. Price $2.50, postage 20 cts.

No. 5. Supplement to Hawaiian Feather Work, with Index to Vol. I. By Wm. T. Brigham. Price 75 cts., postage 8 cts.

Memoirs, Vol. II.

No. 1. Hawaiian Mat and Basket Weaving. By Wm. T. Brigham.—Hawaiian Nets and Nettings. By J. F. G. Stokes. Price $3.00, postage 20 cts.

No. 2. Old Hawaiian Carvings—By Wm. T. Brigham. Price 50 cts., postage 5 cts.

No. 3. The Ancient Hawaiian House. By Wm. T. Brigham. Price $3.00, postage 25 cts.

No. 4. The Volcanoes of Kilauea and Mauna Loa. By Wm. T. Brigham. Price $3.50, postage 30 cts. Completing the volume.

Vol. III. Kapa Making. In press.

14,223

OCCASIONAL PAPERS

OF THE

BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY.

Vol. IV.—No. 5.

Director's Report for 1910.

WITH

INDEX TO VOL. IV.

HONOLULU, H. I.
Bishop Museum Press.
1911

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TO THE TRUSTEES OF THE BERNICE PAUAHI BISHOP MUSEUM.

Sirs:—The present Report is presented in accordance with the new rules adopted by the Trustees on December 15, 1910. These rules read as follows:—

1. Director's Annual Report. While no definite instructions appear of record in the minutes from the Trustees to the Director regarding his Annual Report, the custom exists for the Director each year to present to the Trustees a written report of the work done in the Museum by the Director and the Staff, which report after acceptance by the Trustees is published. The Annual Report of the Director is a record of work accomplished. All recommendations by the Director looking toward the enlargement of the scope of the Museum or any increase in the field of the Staff's activities, should be made the subject of separate reports to the Trustees.

2. Reports by members of the Staff. At the close of each Museum year, each Curator shall report in writing to the Director concerning the work done by him or in his department during that year; plans for work in the future; and such other matters as he may desire to comment upon. These reports shall be transmitted to the Trustees by the Director, for filing in the Trustees' office.

Under these rules this report is submitted.

WILLIAM T. BRIGHAM,
Director of the Museum.

Honolulu, May 20, 1911.

Ordered printed October 19, 1911

REPORT

DURING the whole year 1910, work on the new Laboratory building continued and on December 31, it was still incomplete. In spite of this necessary disturbance, the various departments made fair progress.

Mr. J. W. Thompson, our Modeler, has continued his very excellent work in casting the fishes and coloring these casts in a way that provoked from so competent a judge as President David Starr Jordan, the statement that these painted casts were far better than any paintings of fish he had seen for study and identification. The same authority pronounced our collection of Hawaiian fishes in casts of the greatest value. Many casts of fruit, and of stone and wooden implements, have also been made.

The record of the Printery is not impressive, although there has been no lack of good work; the only publication issued was the last Annual Report. This, in addition to the report, contained in the appendix illustrated articles on Hawaiian Curved Adzes by the Director; Notes on Hawaiian Petroglyphs, I, by the Curator of Polynesian Ethnology; New Hawaiian Plants, II, by the Curator of Botany. The Press has been busy on the many labels required by a growing Museum, and also on the third volume of the Memoirs, which was not completed by the end of the year, certain studies by the Director, on the Museum collection of kapa, having to await the accommodations of the new workrooms, this entailing a delay of six months in the publication of this volume.

In the Library, the increase has been both considerable and valuable, as may be seen by the list of accessions. Much binding of exchanges and other publications issued in parts, has been accomplished by the liberal appropriations of the Trustees. In May, we lost the services of Miss Schupp, who had charge of the Library for several years, as she became Mrs. Paul Messchaert. Until September, when her successor took office, Mr. Stokes had charge. I would here record our entire satisfaction with Miss Schupp's work and the regret of the entire Staff at her departure. Miss E. B. Higgins has been Librarian since September, 1910.

In the department of Entomology, Mr. Swezey has done much work in arranging and relabelling the extensive collection of Hawaiian insects. He reports this as in good preservation.

In the department ot Ethnology, Mr. Stokes has continued his researches on Hawaiian Fish-ponds and Walled Fish-traps, visiting Molokai and taking measurements and photographs from Kaumanamana to Kaluaaha on the southern coast. This investigation has been extended over the other Hawaiian islands, and by correspondence to the other Polynesian groups. I regard this work as of special importance as modern changes in the methods of fish capture and preservation, and the new demands of commerce and war preparation, are destroying these ancient constructions, and the knowledge of their use is fast vanishing from the memories of the old Hawaiians, and by the correspondence, we find that even on the other groups, little can now be gathered. In addition to the care of the Library as mentioned already, Mr. Stokes had entire charge of the Museum, during the absence of the Director from the islands, for five weeks.

Of the gifts to the Museum, one by Rev. W. D. Westervelt, of specimens in stone and pottery collected by him in Mexico, deserves special mention. Among the loan collections, is a very interesting one of relics of the Alii, deposited by Her Majesty Liliuokalani.

In the department of Pulmonata, Dr. Cooke reports the number of Pulmonata added to the collections during the year, was 24204 catalogued under 1811 numbers; 19501 by the Curator; 2368 by Mr. C. N. Forbes of the Staff; and 2335 by others. Forty-one days were spent in the field, and eighty-six localities visited on Molokai, Kauai and West Maui. Specimens were received from the following collectors:— Prof. H. E. Crampton, J. Waterhouse, I. Spalding, H. Meyer, D. Thaanum, E. Deverill, A. F. Judd, R. von Holt, C. H. and R. A. Cooke. Various papers on conchological subjects, have been contributed to Pilsbry's Manual of Conchology.

In the department of Botany, the field work includes a visit to Maui, extending from the latter part of May, to the early part of August, during which a week was spent in camping in the crater of Haleakala, where fine specimens of the Silversword were obtained in flower. The summit peak of West Maui was explored, also the valleys and ridges back of Lahaina and Wailuku and the Hana region, with Nahiku and the country between Keanae and Kipahulu. The Curator Mr. Forbes, reports his work much expedited by the kindness of Messrs. C. J. Austin, W. H. Field, H. J. Howell, C. E. Meyers, L. von Tempsky and W. Weinzheimer. On Oahu the field work has been mainly among the valleys and ridges of the western division. Exchanges have been continued with the Botanic Garden at Sydney, N. S. W., with Mr. E. D. Merrill of the Bureau of Science, Manila; with the Herbarium of Prince Roland Bonaparte, Paris. A valuable collection of 300 Philippine plants was purchased from the collector Mr. A. D. E. Elmer, who is making the most important collections in the Philippine Islands at present. Specimens have been added to the Herbarium also by Messrs J. M. Lydgate and J. W. Thompson.

The attendance for the year is smaller than last year by 834; the total of whites is 734 greater than last year, and there is an increase in all nationalities, except the Japanese who fall behind last year's record by 1885, accounting for the total deficit.

TABLE OF ATTENDANCE.

1910.	Whites.	Hawaiians.	Portuguese.	Chinese.	Japanese.	Others.	Open on		Visitors on closed days.	Average Attendance.		Total Visitors.
							Public days.	Other days.		Public days.	Other days.	
January	645	118	30	64	191	23	9	3	202	966	67	1071
February	728	186	41	352	106	10	9	4	19	156	5	1423
March	508	138	27	101	159	17	8	7	70	110	10	950
April	418	92	33	121	211	10	10	4	52	83	13	885
May	486	111	110	91	124	8	8	6	40	111	7	930
June	362	74	27	87	180	7	8	3	34	88	11	737
July	494	68	48	114	220	30	10	6	82	89	14	974
August	402	106	78	71	163	8	8	5	76	94	15	828
September	324	100	58	186	157	32	9	6	52	89	9	857
October	400	116	50	80	113	14	9	5	65	79	13	773
November	276	109	28	73	397	6	8	3	24	108	3	889
December	414	94	25	48	94	20	10	3	15	68	20	695
Totals	5457	1402	555	1388	2115	185	95	55	731	114.1	17.2	11,012

List of Accessions.

ENTHNOLOGICAL.

Gifts.

9133–9135	Specimens of carving from the Bontoc tribe. Philippine Ids. Given by Mr. A. F. Judd.
9136	Devil house. Fiji. Given by Mr. J. A. Wilder.
9137	Meat hanger. Fiji. Given by Mr. J. A. Wilder.
9138	Club, lotus pattern. Fiji. Given by Master James Wilder.
9146	Stone lamp. Molokai, H. I. Given by Mr. Wm. Mutch.
9147	Stone mortar. Molokai, H. I. Given by Mr. Wm. Mutch.
9150	Tapa. New Guinea Given by Mr. F. Muir.
9151–9152	Feather head-dresses. New Guinea. Given by Mr. F. Muir.
9154	Cast of New Zealand feeding-funnel. Given by Mr. H. G. Beasley.
9708	Stone hammer. Molokai, H. I. Given by Mr. G. P. Cooke.
9709	Phallic Stone. Molokai, H. I. Given by Mr. G. P. Cooke.

9710	2 Hawaiian cents, 1847. Given by Dr. W. T. Brigham.
10239	4 Hawaiian torches. Given by Kapiolani Estate Ltd.
10241–10248	8 Kahili. H. I. Given by Hon. A. S. Cleghorn.

Collection from Mexico. Given by Rev. W. D. Westervelt.

10101	8 knives of obsidian.
10102	4 knives or spear heads.
10103	4 spear heads.
10104	2 obsidian flakes.
10105–10106	Obsidian cores.
10107	Rubbing stone.
10108–10109	Axes.
10110	Spear head, quartz.
10111	Necklace, stone and shell beads.
10112–10113	Spinning whorls, or buttons, of stone or clay.
10114–10121	Spinning whorls, or buttons, of clay.
10122	Oblong bead.
10123	3 broken clay cups.
10124–10125	Tobacco pipes.
10126–10128	Incense burners.
10129	Hollow cylinder.
10130–10134	Handles to clay vessels.
10135–10155	Small human and animal heads in clay.
10157–10175	Idols, clay.
10176	Tortoise, modelled in clay.
10177–10180	Human figures, modelled in clay.
10181	Seal.
10182	Stone implement.
10183–10184	Tapa beaters of stone.
10185	Tapa beater of stone (cast).

Collection given by the Hawaiian Board of Missions.

10186	Drum. Marquesas Ids.
10187	Club. Marquesas Ids.
10188–10189	Staves of office. Marquesas Ids.
10190	Anklet of human hair. Marquesas Ids.
10191–10192	Stretchers for looms. Caroline Ids.
10193–10197	Dance wands. Caroline Ids.
10198	Dance paddle. Caroline Ids.

10199–10206	Spears, tipped with ray stings.
10207	Mask for dancing. Mortlock Ids.
10208	Fillets of Neritina shells. Mortlock Ids.
10209–10210	Baskets. Gilbert Ids.
10211	Adze handle. Marshall Ids.
10212	Adze. Marshall Ids.
10213	Adze or chisel, sharpened both ends.
10214	Paddle. Gilbert Ids.
10215	Club. Gilbert Ids.
10216–10218	Coir armor. Gilbert Ids.
10219	Sword. Gilbert Ids.
10220	Coconut container.
10221	Rattle of 3 Cassis shells.
10222	Paddle. Micronesia.
10223–10224	Wands. Micronesia.
10225	Spear. Solomon Ids.
10226	Club. Solomon Ids.
10227	6 arrows. Solomon Ids.
10228	Mask. New Caledonia.
10229–10231	Ie kuku. Hawaiian Ids.
10232	Hohoa. Hawaiian Ids.
10233	Shells from squid hooks. Hawaiian Ids.
10234	Skull.
10235	Palm fibre.
10236	3 coconut drinking cups.

Purchases.

9139–9140	Kapa anvils. Hawaiian Ids.
9141	Stone sinker. Hawaiian Ids.
9142	Kapuahi kuni anaana. Hawaiian Ids.
9143–9144	Stone lamps. Hawaiian Ids.
9145	Oil dish. Fiji.
9711	Ivory comb. Hawaiian Ids.
9712–9714	Stone mortars. Hawaii, H. I.
9715–9716	Stone lamps. Hawaii, H. I.
9717–9718	Stone adzes. Hawaii, H. I.
9719	Eho pohaku. Hawaii, H. I.
9720	Ulu maika. Hawaii, H. I.
10237	Adze. Hawaii, H. I.
10238	Cane covered with Hawaiian basketry.

Exchanges.

9148	Feather dress. New Guinea.
9149	Basket. South Australia.
9153	Taiaha. New Zealand.
9155–9160	Feather dresses. New Guinea.

Loans.

Collection from Her Majesty Liliuokalani.

L. 433	Feather malo, of Kaumualii.
L. 434–437	Feather lei, of Konia.
L. 438–443	Lei palaoa.
L. 444	Stone mirror, of Kalanikauleleiaiwi.
L. 445–446	Stone mirrors, of Keaweikekahialiiokamoku.
L. 447	Ivory mounted mirror, of Keopuolani.
L. 448	Ivory handle for cane, left by an officer of Captain Cook's vessel.
L. 449	Ivory handle for fan, of Keopuolani.
L. 450	Ivory handle for walking stick, called Kumahumahukolekolekaaka.
L. 451	Ivory comb, of Keopuolani.
L. 452	Tortoise shell comb, of Konia.
L. 453	Jet ear-rings, of Konia.
L. 454	Hair jewelry, of Konia.
L. 455–461	Hair jewelry, of Paki.

Collection from Mr. Bruce Cartwright, Jr.

L. 462	Feather lei, of Queen Emma.
L. 463–467	Bone fish hooks.
L. 468	Piece of fish jaw, probably used as a file.
L. 469	Ivory bead.
L. 470	Stone adze. Fiji.
L. 471	Spear. Solomon Ids.
L. 472	Bow. Solomon Ids.
L. 473	3 arrows. Solomon Ids.
L. 474	Pumice for rubbing down wooden bowls.

BOTANICAL.

J. M. Lydgate, Hawaiian plants	30
J. W. Thompson, Hawaiian plants	3
Botanic Garden, Sydney, by exchange, Australian plants	200
A. D. E. Elmer by purchase, Philippine plants	300
Collected, Hawaiian plants	1776
Total additions	2309

CONCHOLOGICAL.

Charles N. Forbes	Specimens	2368
Others	"	2335
Curator collected	"	19501
Total accessions for the year		24204

New catalogue numbers 1811.

Specimens were received from those noted in the Director's report.

ADDITIONS TO THE LIBRARY.

Accessions denoted by an * were acquired by exchange.

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*California Academy of Sciences, San Francisco.—Proceedings, iii, pp. 49-72.

*Camboué, Rev. P.—Eight scientific papers.

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Sâo Paulo, Brazil.—Museu Paulista.
Stanford University, Cal.—Leland Stanford Junior University.
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  Department of Agriculture.
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  Linnean Society of New South Wales.
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Notes on the Naturalized Flora of the Hawaiian Islands.

By Charles N. Forbes.

The following plants are mainly species not recorded in Hillebrand's Flora,[1] the majority of them having probably become naturalized since 1886. The only record of the naturalized plants which we have had since that time is an addition of a few species in an article by Heller.[2] In order to make these notes complete these species are again mentioned in this paper. It is the intention to continue the notes at irregular intervals as material accumulates.

The naturalized flora occupies the lower valleys and plains, the number of indigenous plants in these localities at present being insignificant. This flora is rapidly encroaching on the native forest, especially where its conditions are changed by fires or grazing. Introduced weeds appear along new trails through the native forest in from two to three weeks in places where it would be impossible to find them before. In the unforested sections of the islands, as a large proportion of the slopes of Haleakala on Maui, naturalized plants occur to the very summit (10,000 feet). A few of the naturalized plants as Crepis japonica are an exception to the rule, in that they occur in the dense forest and are rarely found on the plains; and perhaps a few of the plants considered as indigenous may belong in this category.

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[1] W Hillebrand. Flora of the Hawaiian Islands, 1888.

[2] A. A. Heller. Minnesota Botanical Studies, Bulletin No. 9, pp. 760-922. A portion of Heller's collections are in the Herbarium of the Bishop Museum.

FILICALES.

Ceropteris calomelanos (L.) Und.
Acrostichum calomelanos L., Sp. Pl., ii, 1753, 1072.
Gymnogramma calometanos Kaulf., Enum., 1824, 76.
Ceropteris calomelanos (L.) Und., Torr. Cl., 1902, 29, 632.

The silver fern is well established on all the islands, generally occuring along roadsides and irrigating ditches.

Ceropteris calomelanos var chrysophylla Link.
Gymnogramme chrysophyllum Klf., Enum., 1824, 74.
Ceropleris chrysophylla Link, Sp., 1841, 143.

The gold fern has the same distribution as the former but is less common. On Hawaii it was observed growing in the steam cracks at Kilauea.

HYDROCHARITACEAE.

Halophila ovata Gaud.
Halophila ovata Gaud., Freyc. Voy. Bot., 1826, 430, t. 40. f.
Halophila ovalis Hook., Fl. Tas., 1860, ii, 45.

Miss M. Reed showed me a specimen of this plant which she said was identified by Dr. W. A. Setchell. It occurs in brackish ponds in the vicinity of Honolulu.

LEMNACEAE.

Lemna minor L.
Lemna minor L., Sp. Pl., 1753, 970.

The duck weed is common in ponds and taro patches on all the islands.

CHENOPODIACEAE.

Amaranthus spinosus L.
Amaranthus spinosus L., Sp. Pl., 1753, 991.

A rather common weed on Oahu, probably occurring on other islands as well.

C. N. F., no. 1060. O. Nuuanu Valley.

POLYGONACEAE.

Rumex acetocella L.
Rumex acetocelta L., Sp. Pl., 1753, 338.

The sorrel occurs on all the islands and at all elevations. First reported from Kauai by Heller.

Rumex patentia L.
Rumex patentia L., Sp. Pl., 1753, 333.

A few specimens of this species were observed at Nahiku Landing, E. Maui. The plant also occurs as a weed in cane fields on Hawaii.

C. N. F., no. 265. M.

PORTULACACEAE,

Portulaca lutea Sol.
Portulaca lutea Sol., Ex Forst. f. Pl. Escul., 1786, 72. Seem. Fl. Vit., 9.
Portulaca flava DC., Prod., 1843, iii, 355.

This species occurs as a rather rare shore plant, probably on all the islands. This museum has specimens collected on Marcus, Midway and Laysan islands by W. A. Bryan, while it has been reported from Necker island by W. K. Fisher[3] and from Hawaii by Dr. Guppy.[4] It also occurs on Oahu near Kaena Point, and should be considered as indigenous.

C. N. F., no. 1650. O.

CARYOPHYLLACEAE.

Drymaria cordata (L.) Willd.
Holosteum cordatum L., Sp. Pl., 1753, 88.
Drymaria cordata Willd., Roem & Schultes, Syst. Veg., 1819, 5, 406.

Observed by Heller on Kauai. Occurs on all the islands.

Polycarpon tetraphyllum L.
Polycarpon tetraphyllum L., Sp. Pl., 1753, 881.

Observed at Makawao, E. Maui.

C. N. F., Aug. 1910. M.

Tissa marina (L.) Britton.
Arenaria rubra var marina L., Sp. Pl., 1753, 423.
Spergularia salina Presl., Fl. Cech., 1819, 95.
Buda marina Dumort, Fl. Belg., 1827, 110.
Spergularia media A. Gray, Man., 1867, 5, 95.
Tissa marina Britton, Bul. Torr. Club, 1889, 16, 126.
Buda marina var minor S. Wats., A. Gray, Man., 1890, Ed. vi, 90.

Near the beach in various places between Diamond Head and Koko Head on Oahu.

C. N. F., no. 1501. O.

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[3] W. K. Fisher. Bul. U. S. Fish Commission, vol. xxiii, pt. iii, 1903, p. 807.

[4] H. B. Guppy. Observations of a Naturalist in the Pacific, vol. ii, p. 555.

RANUNCULACEAE.

Ranunculus parviflorus L.
Ranunculus parviflorus L., Sp. Pl., 1763, Ed. ii, 780.

In the forest below Kaalapuuwale on the slopes of Hualalai on the island of Hawaii, occurs a species of Ranunculus which I refer to the above. This diffuse plant with minute yellow flowers and hispid carpels covers many acres; mainly in the dead Koa forest, although some specimens were found in virgin forest. This place is also a locality for R. mauiensis, the two species often growing close together; while within a mile can be found R. hawaiiensis, the other native species. My determination is based on the description found in Britton and Brown's Flora of the Northern States and Canada.
C. N. F., no. 275. H.

ANONACEAE.

Anona cherimolia Mill.
Anona cherimolia Mill, Gard. Dic. Ed. viii, 1768,n. 5.

The cherimolia is well established on Hawaii, especially in the drier localities.
C. N. F., no. 365. H.

CRUCIFERAE.

Brassica campestris L.
Brassica campestris L., Sp. Pl., 1753, 666.

Rather common on Oahu, also occurring on the other islands.
C. N. F., March 18, 1909. Moanalua Valley, Oahu.

Raphanus sativus L.
Raphanus sativus L., Sp. Pl., 1753, 669.

Rare, to be expected on all the islands. Mentioned by Hillebrand as occurring on Kauai.
C. N. F., April 6, 1909. Moanalua Valley, Oahu.

Sisymbrium officinale (L.) Scop.
Erysimum officinale L., Sp. Pl., 1753, 660.
Sisymbrium officinale Scop., Fl. Carn. Ed. ii, 1772, 2, 26.

The hedge mustard was first observed at Puuwaawaa on Hawaii, and later at various places on that island.
C. N. F., no. 9. H.

ROSACEAE.

Rosa sp.

A small flowered multi-petalled rose is well established on Hawaii and in certain places on Maui. On Hawaii it is known as the volcano rose, as it is especially common on the road to the volcano of Kilauea. Dr. W. T. Brigham observed this rose more than forty years ago along the trail to the Kapena Falls on Oahu; and he believes it may have been taken to the other islands from this locality. It has not become naturalized on Oahu.

Rubus jamaicensis L.
Rubus jamaicensis L., Mant., i, 1767, 75.
Rubus jamaicensis Sw., In Griesb. Fl. Brit. W. Ind., 1864, 231.

The so-called thimble-berry is common on Hawaii and in certain places on Maui. It is said to have been introduced from the West Indies.

Dr. W. T. Brigham & C. N. Forbes, Kilauea, 1908. C. N. F. no. 238. M. Keanae, Maui.

LEGUMINOSEAE.

Caesalpinia sappan L.
Caesalpinia sappan L., Sp. Pl., 1753, 381.

Found in gulches near Wahiawa, Oahu.

C. N. F., no. 1443. O.

Cassia chamaecrista L.
Cassia chamaecrista L., Sp. Pl., 1753, 379.

Common about Honolulu, Oahu.

Heller, no. 1969.

Cassia laevigata Willd.
Cassia laevigata Willd., Enum. Hort. Berol., 1813, 441.

Occurs on all the islands. Rather common on Oahu.

Heller, no. 2295.

Crotalaria fulva Roxb.
Crotalaria fulva Roxb., Fl. Ind., 1832, 3, 266.

Crotalaria saltiana Andr.
Crotalaria saltiana Andr., Bot. Rep., 1811, pl. 648.
Crotalaria striata DC., Prod., 1825, ii, 131.

Crotalaria spectabilis Roth.
Crotalaria sericea Retz. (not Burm.), Obs. Bot., 1779-91, 3, 26.
Crotalaria spectabilis Roth., Nov. Pl. Sp., 1821, 341.

The Crotalarias form a conspicuous portion of the naturalized flora of the islands.

Fleminga strobulifera R. Br.
Fleminga strobulifera R. Br., Ait. Hort. Kew. Ed. ii, 1810-13, 350.
Fleminga bracteata Wight, Ic., 1840-53, 268.
Fleminga fruticulosa Wall, Cat., 1828, 5754.
Fleminga abrupta Wall, Cat., 1828, 5755.

I am indebted to Mr. C. J. Austin for showing me this plant. It occurs in company with Psidium guajava at Nahiku, East Maui. The plant is widely spread in India, where it is said to be very variable. It is a small shrub, and can be distinguished by the conspicuous folded bracts which hide the small flowers.

Medicago apiculata Willd.
Medicago apiculata Willd., Sp. Pl., iii, 1803, 1414.

Rather rare but probably has the same range as the next species. It can be recognized by the unarmed pods. In the Index Kewensis it is regarded as being synomymous with the next. C. N. F., no. 1718. O. Honolulu, Oahu.

Medicago denticulata Willd.
Medicago denticulata Willd., Sp. Pl., iii, 1803, 1414.

The bur clover is more or less common on all the islands. According to Van Dine,[5] it was introduced on Maui in 1882.

Medicago intertexta Mill.
Medicago intertexta Mill, Gard. Dict. Ed. viii, 1768, n. 4.

The above species is reported to be common about Honolulu, by Heller.

Melilotus indica (L.) All.
Trifolium melilotus L., Sp. Pl., 1753, 764.
Trifolium indicum Thunb., Prod. Pl. Cap., 1800, 136.
Melilotus indica All., Fl. Pedem I, 1785-89, 308.
Melilotus parviflora Desf., Fl. Atlant., 1800, ii, 187.
Melilotus minima Roth., Nov. Pl. Sp., 1821, 361.
Melilotus occidentalis Nutt., ex Torr & Gray, Fl. N. Am., 1838, i, 321.
Melitotus regulosa Willd., Enum. Hort. Berol., 1809, 789.

Rather common on Oahu and Hawaii; probably on all islands.

Trifolium repens L.
Trifolium repens L., Sp. Pl., 1753, 767.

The white clover is common in the pastures on Haleakala, Maui.

GERANIACEAE.

Erodium cicutarium (L.) L'Her.
Geranium cicutarium L.. Sp. Pl., 1753, 680.
Erodium cicutarium L'Her., Ait. Hort. Kew., 1789, 2, 414.

Oahu, not common.

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[5] Hawaii Agr. Exp. Station Rept., 1908, p. 25.

Geranium carolinianum L.
Geranium carolinianum L., Sp. Pl., 1753, 683.

This plant not only occurs on Hawaii as stated by Hillebrand; but is also common on Haleakala, Maui.

C. N. F., no. 218. M.

MALVACEAE.

Modiola caroliniana (L.) Don.
Malva caroliniana L., Sp. Pl., 1753, 688.
Modiola multifida Moench. Meth., 1791, 620.
Modiola caroliniana Don., Gen. Hist. Pl., 1831, i, 466.

Rather common on the slopes of Mauna Kea, Hawaii.

C. N. F., no.458. H.

Two species of Abutilon not yet identified are very common on all the islands.

PASSIFLORIACEAE.

Passiflora edulis Sims.
Passiflora edulis Sims., Bot. Mag., 1818, 1989.

Sometimes plentiful, and to be expected in the forests of all the islands. Hillebrand says in his flora, 1871, "already escaped into the woods of East Maui." Native name, *lilikoi.*

Passiflora foetida L.
Passiflora foetida L., Sp. Pl., 1753, 959.

An occasional roadside plant.

ONAGRACEAE.

Epilobium Billardierianum ? Ser.
Epilobium Billardierianum Ser., DC. Prod., 1843, iii, 41.

A species of Epilobium which I have provisionally referred to the above, is very common on Haleakala.

C. N. F., no. 173. M.

UMBELLIFERAE.

Apium leptophyllum (DC.) F. Mull.
Sison Ammi L., Sp. Pl., 1753, 252.
Heliosciadium leptophyllum DC., Prod., 1830, iv, 105.
Apium leptophyllum F. Mull., Benth. Fl. Aust., 1866, iii, 372.
Apium Ammi Urban., Mart. Fl. Bras., 1879, ii, pt. i, 341.

First observed at Makawao, Maui. Not common on the islands.

C. N. F., Makawao, Maui.

Apium petroselinum L.
Apium petroselinum L., Sp. Pl., 1753, 264.
Petroselinum sativum Hoffm., Gen. Umb., 1814, 177.

Common parsley. A coarse leaved form occurs along irrigating ditches on West Maui. Reported from Hanapepe Valley, Kauai, by Heller.

C. N. F., no. 74. M. Wainee Gulch, Maui.

Foeniculum vulgare (L.) Gaertn.
Anethrum foeniculum L., Sp. Pl., 1753, 263.
Foeniculum vulgare Gaertn., Fruct. & Seem., 1788, i, 105.
Foeniculum foeniculum Karst., Deutsch. Fl., 1880-83, 837.

The fennel is very common on Maui and in certain localities on Hawaii. Mentioned in Mann's Flora,[6] but overlooked by Hillebrand.

PRIMULACEAE.

Anagallis arvensis L.
Anagallis arvensis L., Sp. Pl., 1753, 148.

Occurs on all the islands.

LOGANIACEAE.

Buddleia asiatica Lour.
Buddleia asiatica Lour., Fl. Cochinc., 72. Benth in DC. Prod., x, 416.

This plant is very common in the valleys of the Waianae range on Oahu, sometimes occurring as small trees six to ten feet high, while at other places it occurs as a subherbaceous plant of three to four feet. It also occurs in the dense forests of the Koolauloa range, and has all the appearances of an indigenous plant. One form is nearly glabrous.

C. N. F., Sept., 1908, Punaluu Mts. C. N. F., Makaha Valley, Kaala Mts., Feb. 12-19, 1909.

GENTIANACEAE.

Erythraea centaurium (L.) Pers.
Gentiana centaurium L., Sp. Pl., 1753, 229.
Erythraea centaurium Pers., Syn., 1805, i, 283.

This plant is well established on East Maui and Hawaii. It is generally found on grazing land.

C. N. F., no. 180. M. Paia, Maui.

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[6] Horace Mann. Flora of the Hawaiian Islands. Communications Essex Institute, Salem, Mass., vi, 1871.

CONVOLULACEAE.

Ipomaea chryseides Ker-Gaul.
Ipomaea chryseides Ker-Gaul., Bot. Reg., 270.

Nuuanu Valley, Oahu. Not common.
C. N. F., no. 1360. O.

Ipomaea grandiflora Lam.
Ipomaea glaberrima Boj., Hook. Journ. Bot., 1834, 357.
Ipomaea grandiflora Lam., Tab. Ency., i, 467. Roem. & Schult., Syst., iv, 240.

Dr. Guppy[7] records his species for the first time from Hawaii. His localities were a mile west of Kapa-ahu and the coasts of Kalae. There are no specimens in this herbarium.

Ipomaea peltata Chois.
Convolvulus peltatus L., Sp. Pl., 1753, 121.
Ipomaea peltata Chois., Conv. Or., (?), 70. DC. Prod., ix, 359.

This species were observed by Mr. J. M. Lydgate a number of years ago in Wainiha Valley on Kauai, and judging from the locality in which he observed it, he had no hesitation in calling it indigenous. The flowers of our plant are yellow and all the leaves are peltate.
J. M. Lydgate, Wainiha Valley, Kauai, 1909.

LABIATAE.

Prunella vulgaris L.
Prunella vulgaris L., Sp. Pl., 1753, 600.

Very common on the cattle ranges of Haleakala, Maui. Also occurs on Hawaii but has not spread to any extent on this island.

SOLANACEAE.

Cestrum diurnum L.
Cestrum diurnum L., Sp. Pl., 1753, 191.

This species has escaped from cultivation and has become established in several places on Oahu. Several species of Cestrum have been in cultivation on these islands for a long time. I have heard the name Chinese ink-berry applied to this plant.

Nicotiana tabacum L.
Nicotiana tabacum L., Sp. Pl., 1753, 180.

Naturalized in various parts of Maui, especially on the northeast side.

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[7] H. B. Guppy. Observations of a Naturalist in the Pacific, vol. ii, pp. 52, 554.

Solanum sodomeum L.
Solanum sodomeum L., Sp. Pl., 1753, 187.

This African species is rather common on Oahu. First recorded by Heller.

ACANTHACEAE.

Thunbergia alata Boj.
Thunbergia alata Boj., Sims. Bot. Mag., 2591.

A troublesome garden weed in Honolulu.

Thunbergia alata var aurantiaca Ktz.

This variety occurs as a roadside plant in Pauoa Valley on Oahu.

PLANTAGINACEAE.

Plantago lanceolata L.
Plantago lanceolata L., Sp. Pl., 1753, 113.

This species usually occurs at rather high elevations, 2000 to 3000 feet. Observed on all the islands.

RUBIACEAE.

Sherardia arvensis L.
Sherardia arvensis L., Sp. Pl., 1753, 102.

Maui, slopes of Haleakala.

C. N. F., no. 217. M.

CUCURBITACEAE.

Momordica charantia L.
Momordica charantia L., Sp. Pl., 1753, 1009.

Met with on all the islands, especially in rather dry localities where it climbs over rocks and stone walls. Near Kailua on Hawaii, it covers acres of rough aa flows, and is regarded as a bad pest.

Another cucurbit with spiney fruits not yet identified is fairly common on all the islands.

COMPOSITAE.

Carduus lanceolatus L.
Carduus lanceolatus L., Sp. Pl., 1753, 821.
Cirsium lanceolatum Scop., Fl. Carn. Ed. ii, 1772, 2, 130.
Cnicus lanceolatus Willd., Prodr. Fl. Berol., 1789, 259.

The common bur-thistle is well established on Hawaii and in several places on Maui.

C. N. F., no. 116. M. Hanaula W. Maui.

Chrysanthemum leucanthemum L.
Chrysanthemum leucanthemum L., Sp. Pl., 1753, 888.
Leucanthemum vulgare Lam., Fl. Fr., 1778, 2, 137.

The white daisy is rather common on Hawaii where it was observed growing on the slopes of Hualalai to the summit, and on the slopes of Mauna Loa.

Emilia flammea Cass.
Emilia flammea Cass., Dict. Sc. Nat., 1819, 14, 406.

A roadside plant on Oahu, first recorded by Heller. There are specimens in the Museum herbarium collected several years before Heller's collection.

Eupatorium sp.

A species of Eupatorium has lately become one of the most common plants on Maui.

C. N. F., no. 46. M. Hanakaoo, W. Maui. Dr. W. T. Brigham, Haleakala, E. Maui.

Hypochaeris radicata L.
Hypochaeris radicata L., Sp. Pl., 1753, 811.

Rather common on Haleakala, Maui, Probably on Hawaii. Reported from Kauai by Heller.

Lapsana communis L.
Lapsana communis L., Sp. Pl., 1753, 811.

Rather common on Maui and Hawaii.

Taraxacum officinale (L.) Weber.
Leontodon taraxacum L., Sp. Pl., 1753, 798.
Taraxacum officinale Weber, Prim. Pl. Holst., 1780, 56
Taraxacum dens-leonis Desf., Fl. Atlant., 1800, 2, 228.
Taraxacum taraxacum Karst., Deutsch. Fl., 1880-83, 1138.

The dandelion occurs on all the islands. It appears to have been introduced on the different islands from different sources. It has been observed on Kauai for at least twenty-five years, while a gentleman on Maui says it was introduced to that island very recently from New Zealand.

Zinnia pauciflora L.
Zinnia pauciflora L., Sp. Pl., 1753, Ed. ii, 1269.

This species in company with Verbesina enceloides (Cav.) A. Gray, is very common about the cane fields in the vicinity of Lahaina, Maui.

C. N. F., Aug., 1910.

ADDENDA.

FICOIDEAE.

Tetragonia expansa Murr.
Tetragonia expansa Murr., Comm. Gotting., 1783, vi, 13.
Tetragonia halimifolia Forst., Prod. 1786, 39.
Tetragonia cornuta Gaertn., Fruct., 1788, ii, 483.
Tetragonia inermis F. Mull., Linnaea., 1852, xxv, 384.
Tetragonia quadricornis Stokes, Bot. Mat. Med., (?), iii, 127.

This plant, generally known as the New Zealand Spinach was collected on the beach near Makapu point on Oahu. This is one of the localities where logs from the north-west coast of America are washed on to the beach. The plant is rather widely distributed on the shores of the Pacific, and has been cultivated in Europe.

C. N. F., no. 1406. O.

COMPOSITAE.

Senecio vulgaris L.
Senecio vulgaris L., Sp. Pl., 1753, 867.

The groundsel probably occurs on all the islands. It generally grows in partly forested sections. There are specimens in the herbarium from Maui, Hawaii and Oahu.

C. N. F., nos. 202. M. and 1695. O.

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